MINERALS

ECONOMIC & REGIONAL DEVELOPMENT AGREEMENT

Sector A Geoscientific Activities Progress Report 1984·85

Canada

Manitoba

ERRATA for Sector A - Geoscience Activities Progress Report 1984-85

1. Text for Page 76 should read as follows:

Prospectors and Developers Association

Poster-Chromite mineralogy of Bird River Sill, Scoates, R.F.J., Duke, M., Thompson, P., Hawthorne, F., Watkinson, D., Talkington, R.W., Jones, P.C., and Watson, D.M.

2. Text on Page 76 should appear on Page 78.

3. Text on Page 78 is an early draft and should be deleted.

85-6132/

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CANADA - MANITOBA

MINERAL DEVELOPMENT AGREEMENT

1984-89

SECTOR 'A' GEOSCIENTIFIC ACTIVITIES

PROGRESS REPORT 1984-85

Manitoba

Energy and Mines

Geological Services

Open File Report OF85-9

Frontispiece: New extensions to the Core Storage Library at The Pas

FOREWORD

The following report outlines progress made during 1984-85 by Geoscientific investigations mounted under Sector 'A' of the Canada-Manitoba Mineral Development Agreement.

Release of the information, at this time, is intended to provide the mineral industry with an up-to-date review of activities conducted during the 12-month period ending March 31, 1985, as well as an outline of projects scheduled for implementation during 1985-86.

As such the report should be regarded as a supplement to other publications released throughout the lifetime of the Agreement as well as annual reports of field activities issued each November and January by Manitoba and Canada, respectively.

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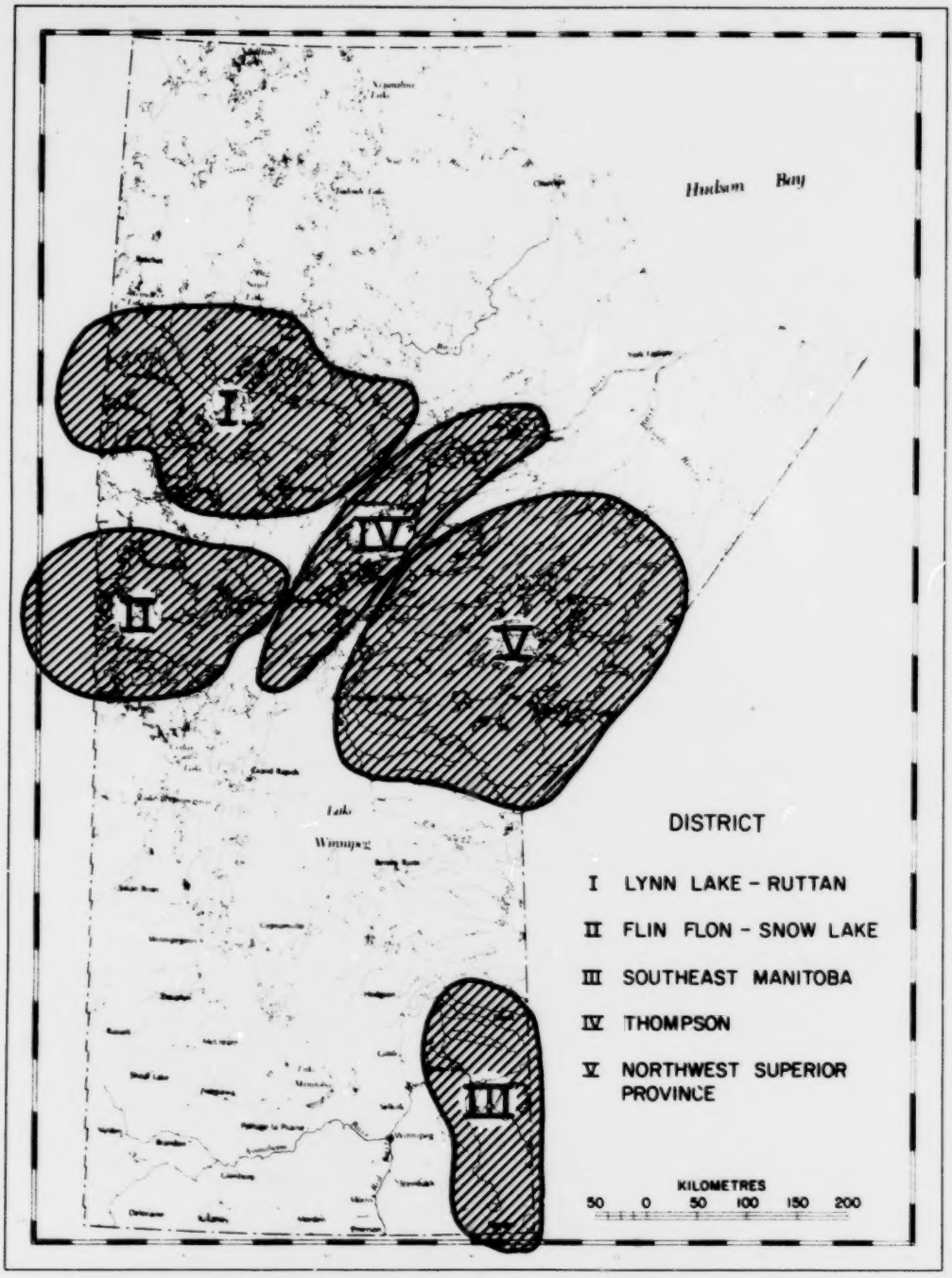


Figure 1: Canada-Manitoba Mineral Development Agreement; Focus of 'Sector A' Geoscientific Activities.

I. AGREEMENT PROFILE

Mandate

In a decision dated November 25, 1983, the Federal and Provincial Cabinets approved both the umbrella Economic and Regional Development Agreement and the subsidiary Canada/Manitoba Mineral Development Agreement. The Mineral Development Agreement was formally signed by the Honourable Wilson D. Parasiuk for Manitoba on February 22, 1984, and by the Honourable W. Romkey for Canada on April 18, 1984. The Agreement is for a 5-year term (1984-89), and the Federal and Provincial governments will contribute $14.8 million and $9.9 million, respectively, for a total of $24.7 million (Table 1).

Under the terms of the Agreement, Canada and Manitoba will implement geological, geochemical and geophysical surveys, research into mining technology development, marketing and other mineral economic studies in order to improve the level and effectiveness of mineral exploration, and to investigate potential new developments that could lead to a diversification of the mineral base currently exploited in the Province.

Structure

The work to be accomplished under the Agreement has been organized into four sectors. The Federal and Provincial program will be jointly planned and coordinated by a Management Committee, but will be delivered entirely in parallel.

The four sectors are:

A. GEOSCIENTIFIC STUDIES

B. MINING AND MINERALS TECHNOLOGY RESEARCH AND DEVELOPMENT

C. DEVELOPMENT STUDIES

D. PUBLIC INFORMATION, EVALUATION AND ADMINISTRATION

Management Committee

A Management Committee was established with two Provincial members and two Federal members.

The Committee has met formally on four occasions the last being on February 26, 1985, in Ottawa.

Technical Subcommittees

Technical subcommittees, as listed on the inside of the front cover, have been established for each sector of the Agreement.

Informal technical Working Groups will facilitate coordination of Federal and Provincial program delivery under Sector A.

Figure 2 illustrates how Federal-Provincial officials relate with respect to the activities carried out under this Agreement.

Industry Involvement

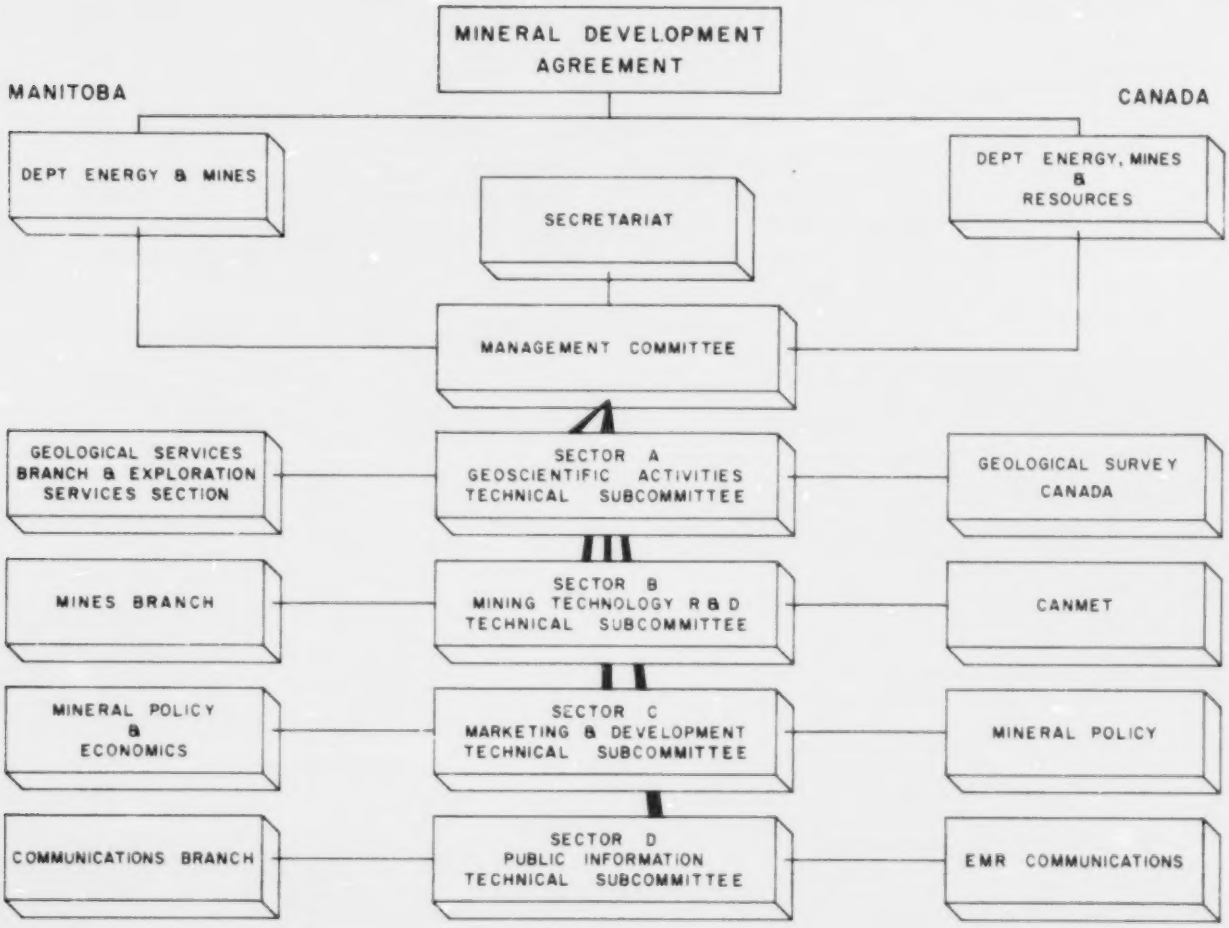
Industry will be encouraged to play an active role in providing feedback on MDA activities through such mechanisms as liaison committees, questionnaires, discussions between investigators at a project level, and more general critical comments in response to the frequent information releases that will comprise a key component of the governmental program delivery. In addition, semi-annual reports of programs will be submitted to the ERDA Ministers and Management Committee, as well as the customary Winnipeg annual Meeting with Industry in November of each year, and GSC Forum the following January in Ottawa.

TABLE 1: CANADA-MANITOBA MINERAL DEVELOPMENT SUBAGREEMENT
SUMMARY OF COSTS 1984-89*
($000,000's)

Sector/Program/Project	Federal Share	Provincial Share	Total Costs 5-years
SECTOR A: GEOSCIENTIFIC ACTIVITIES			
Program			
1. Precambrian Geological Investigations	0.90	1.10	2.00
2. Minerals Investigations	1.25	2.05	3.30
3. Geophysical Surveys	2.45	0	2.45
4. Geochemical Surveys & Glacial Prospecting	2.90	0.25	3.15
5. Geological Compilation	0.50	1.60	2.10
Subtotal Sector A	8.00	5.00	13.00
SECTOR B: RESEARCH AND TECHNOLOGY			
Program			
1. Mining Technology			
2. Mine Productivity		.75	.75
Project			
2.1 Ground Control	1.32		1.32
2.2 Warning Systems	.295		.295
2.3 Exposure Index		.295	.295
Program			
3. Processing Technology			
Project			
3.1 SO_2 Reduction	2.180		2.180
3.2 Milling Research	.470		.470
3.3 Tailings Research		1.10	1.10
3.4 Industrial Minerals	.4	.62	1.02
Subtotal Sector B	4.665	2.765	7.43
SECTOR C: DEVELOPMENT STUDIES	.885	.885	1.77
SECTOR D: PUBLIC INFORMATION, etc.	1.25	1.25	2.5
	14.80	9.90	24.70

*Amounts are estimated and subject to confirmation.

Figure 2: Federal-Provincial liaison network and government agencies contributing to programming under the Canada-Manitoba Mineral Development Agreement (1984-89).



II PROGRESS REPORT TO MARCH 31ST, 1985

1. REVIEW OF ACTIVITIES 1984-85:

The Workplan implemented during 1984-85 reflected an accelerated level of parallel programming (using the existing expertise and delivery capability of the Federal and Provincial Geological Surveys) encompassing the following components:

1. Emphasis was given to established mining districts with rapidly dwindling reserves.

2. Outputs should be of immediate benefit to private sector exploration.

3. Scope of investigations would include documentation relevant to traditional exploration interests (copper, zinc and gold) as well as potential for diversification into other mineral products.

4. Complementary use would be made of Federal and Provincial resources with minimum duplication of effort.

5. Optimum use of appropriate technologies and methodologies including, wherever possible, state-of-the-art contributions from universities with requisite expertise.

6. Increased emphasis on generating empirical data through intensive sampling of potentially mineraliferous areas with attendant back-up analysis and assay for relevant metals and elements.

Geoscience activities constitute 5 specific categories of programming.

1. Precambrian investigations
2. Minerals investigations
3. Geophysical Surveys
4. Geochemical Surveys and Basal Till studies
5. Compilation and Core Retrieval

Resources were allocated to the respective districts (Fig. 1) in the sequence I - Lynn Lake/Ruttan, II - Flin Flon/Snow Lake, III - SE Manitoba, IV - Thompson, V - NW Superior, VI - Winnipeg-based programming generally with application to various regions of the Province (Table 2).

Table 2:

GEOSCIENCE EXPENDITURE SUMMARY 1984-85

	LYNN LAKE	FLIN FLON	S.E.MAN.	THOMPSON	N.SUPERIOR	ANCILLARY	TOTAL
(x1000) $ Allocation (Fed. & Prov.)	1409.0	754.5	223.5	156.0	182.0	482.0	3207.0
%	44	23	7	5	6	15	100

60 university students were employed and appointed to various projects by the outset of the field season in late May. 5586 days of student employment and training were provided in support of the summer field surveys and investigations by the Province.

Regional briefings on MDA objectives and programming proposals were given to industry geologists at Flin Flon and Lynn Lake (local CIM), and were augmented by field demonstrations and tours in these and other parts of the Province, for the benefit of both industry and Federal Government geologists.

Questionnaire:

An 8-page Questionnaire was distributed to about 100 industry delegates at the Provincial annual meeting, to solicit feedback on the appropriateness and focus of the first year's geoscientific programming. Twenty-seven responses unanimously endorsed the types of activities being undertaken as well as the emphasis given to the Lynn Lake, Flin Flon, and SE Manitoba districts (unpublished internal report).

Several recommendations for new projects identified in the feedback to the questionnaire and in subsequent discussions with industry personnel have been incorporated into the Workplan for 1985/86, which was subsequently approved by the Federal/Provincial Management Committee on February 26, 1985.

A high level of one-to-one dialogue and informational exchanges is being maintained by Provincial Geologists (Geological Services Branch provided advice to approximately 40 representatives of Mining Companies and minerals interests during the 1984 season and 285 responses to external mineral-related enquiries in the period November 1984 - March 1985).

Mineral Exploration Liaison Committee

A Mineral Exploration Liaison Committee similar to those now operating in other provinces has been established in order to facilitate a more formal dialogue with industry and to solicit comment on the appropriateness of Sector

A initiatives. Invitations for representation were distributed to the Manitoba Mining Association, the Canadian Institute of Mining and Metallurgy - Winnipeg Branch, the Prospectors and Developers Association and the Manitoba and Saskatchewan PDA. On March 28, 1985, copies of the approved workplan for 1985/86 were sent to these organizations in order to brief them on the work to be undertaken in 1985.

As currently envisaged the Committee (comprising 4 industry and 4 government representatives) will meet once a year immediately after the annual (November) meeting with industry to pass comment on the activities mounted during the year and to put forward recommendations for new initiatives for consideration and possible incorporation into workplans under development. Throughout the remainder of the year the committee would be kept informed on and monitor agreement activities as outlined in Table 3, provisional schedule for MELC involvement.

Outputs:

Technical maps and reports generated during the first year have had widespread distribution and (2) are in second printings. Geological concepts and techniques evolved and demonstrated by government geologists have resulted in increased private sector exploration for gold in the Bissett district, and have attracted several companies, previously inactive in the Province, into northern districts with gold potential, specifically along the Kisseynew and Agassiz metallotects.

A comprehensive listing of products and informational releases generated during 1984-85 is provided in the section on outputs following the Project Reports.

Activities mounted under Program 5 (Compilation and Information) led to creation of 1,109 days of employment in the north, including construction of an extension to the drill core shed at The Pas (Frontispiece); collection, storage and cataloguing of 82,000 ft. of drill core from 19 sites; and 38 industry visits to core libraries at various locations throughout the Province.

The results of the field work (covering 47 Provincial and 16 Federal projects) were released at the annual Provincial meeting with industry (223 registrants) on November 14-15th, along with a Report of field activities (183 pages), 12 preliminary maps, 2 Open File reports, displays and oral presentations on key components of the programming, including presentations from the Geological Survey of Canada and the Department of Earth Sciences, University of Manitoba.

MDA activites were also outlined in Provincial displays presented at the annual Prospectors and Developers Conference in Toronto (March 10-13, 1985) with about 3000 delegates in attendance. (Fig. 3).

Applied Geoscience Research:

In this the first year of the agreement, the Province initiated 8 Geoscience Research Agreements with universities in Canada (Manitoba 4; Windsor 2; Waterloo 1; Western Ontario 1), as well as conducting cooperative research with NASA geologists and specialists at York University Toronto, the University of Kansas, Royal Ontario Museum and Memorial University, Newfoundland.

The Geological Survey of Canada Workplan for 1984/85 included 5 research agreements with the University of Manitoba, as well as research contracts from Queen's University and the University of Toronto.

Figure 3: Provincial Poster Displays at Prospectors & Developers Convention, Toronto, March 1985.

Table 3:

PROVISIONAL SCHEDULING OF MINERAL EXPLORATION LIAISON COMMITTEE (MELC) INVOLVEMENT

INDUSTRY - GOVERNMENT INTERACTION		GEOLOGICAL SERVICES - PLANNING & OPERATONS CYCLE
	APRIL - MAY	[Initial outline of NEXT year's program.]
Outline of GSB programs presented in regions	MAY - JUNE	Beginning of CURRENT year's activities.
Dialogue and field trips with industry geologists in regions (as required)	MAY - SEPT.	GSB field investigations.
	AUGUST	[Submission of initial estimates for NEXT year].
	SEPT. - OCT.	Preparation of Report of Field Activities and maps.
Dialogue at Annual Meeting (questionnaire?)	NOVEMBER	Release of CURRENT year's findings.
MELC meeting - review and proposals for NEXT year		General outline of NEXT year's programs available.
Continuing exchanges on one-to-one basis at technical level	DEC. - FEB.	[Refinement of Workplan for NEXT year].
	FEB. - MAR.	[Approval of Workplan and Estimates].
Workplan forwarded to MELC for information and comment	MARCH	Status report on all MDA projects (Open File under consideration).

2. PROGRESS REPORT

Introduction

The following Project Reports outline Geoscientific Activities conducted under Sector A of the Canada-Manitoba Mineral Development Agreement, a subagreement to ERDA.

The objectives of the program are to provide scientific and technical information on the whereabouts, nature and composition of rock and mineral formations in the Province that will ultimately lead to greater and more effective use of these resources.

The information generated as a result of these investigations and exploratory surveys will:

- improve the effectiveness of mineral exploration in establishing mining districts, especially those now experiencing a rapid depletion of ore reserves.

- identify new exploration targets in promising mineral areas.

- explore potential for diversifying the mineral base in areas dependent on a single or limited number of commodities.

- promote increased awareness of Manitoba's mineral development potential by giving greater visibility to the Province's significant and diverse mineral attributes.

GEOSCIENTIFIC PROGRAMMING - DISTRICT SUMMARIES

DISTRICT I. LYNN LAKE-RUTTAN

SUMMARY:

Geological surveys and mineral investigations in the Lynn Lake-Ruttan region aim to establish guidelines for mineral exploration activities searching for new base and precious metal ore deposits. In addition to providing geological base maps, the Provincial and Federal surveys will generate airborne geophysical and ground geochemical data intended to assist in locating known mineral occurrences and their continuation through areas of poor exposure and thick overburden. High precision analytical techniques are being used to determine the age of the geological formations and to glean information on their potential to contain gold, copper and zinc ore deposits. Glacial dispersion fans of ore minerals derived from mineralized zones that are now buried beneath sand, gravel and clay deposits are being used as an indicator to locate these otherwise concealed deposits. In 1984/85 these

studies focussed on the regions down-ice from the Fox and Agassiz Mines and the Lar deposit.

Between Dot and Barrington Lakes peat-bog, spruce needle and other vegetation sampling were used to test biogeochemical techniques for detecting and tracing buried mineralized zones.

All investigations are ultimately designed to determine the key geological factors controlling the occurrence of metal concentrations so that exploration efforts by the mineral industry can be concentrated with maximum effect in areas more likely to have a higher potential for new mineral deposits.

PROJECT LISTING 1984-85:

MANITOBA (Geological Services Branch, GSB)

1.1	Geological mapping, Big Sand-Brochet area	D.C.P. Schledewitz
1.2	Uranium/lead isotope investigations	E.C. Syme, T. Gordon++
1.3	Rubidium/strontium isotope investigations	G.S. Clark
1.4	Stratigraphic drilling, Agassiz metallotect	M.A.F. Fedikow
2.1	Mineral occurrence documentation, McGavock Lake area	D.A. Baldwin
2.2	Gold deposits, Cartwright Lake, Beaucage Lake and Johnson Shear	D.A. Baldwin, D. Peck
2.3	Mineral occurrence documentation, Laurie Lake area	D.A. Baldwin, D. Peck
2.4	Peat bog geochemistry and Agassiz biogeochemistry	M.A.F. Fedikow
2.5	Industrial minerals evaluation, Lynn Lake	VACANT
2.6.1	Applied geoscience research, Lynn Lake stratigraphy and structure - Fox mine	P.E. Olsen, D.A. Baldwin
2.6.2	'LAR' deposit alteration	S. Elliot*, E.C. Appleyard*, D.A. Baldwin
4.1	Basal till investigations, Farley Lake	E. Nielsen
4.2	Basal till investigations, 'LAR', Nokomis and Dot Lakes	E. Nielsen
5.1	1:250 000 Synoptic geological compilations (64B and 64C)	H.V. Zwanzig
5.2	Drill core retrieval, Lynn Lake	P. Doyle, W.D. Fogwill
5.3	Lynn Lake Reports and Maps	H.V. Zwanzig, H.D.M. Cameron et al.
5.4	Ruttan Reports and maps	D.A. Baldwin

CANADA (Geological Survey of Canada, GSC)

C.1.1.1	Mineralized Alteration zones, Southern Churchill Province	E. Froese**, B.A. Barham+++
C.1.1.2	Metamorphism in the Lynn Lake-Laurie Lake Area	T.M. Gordon, S.A. Jackson+++
C.1.1.3	U/Pb Geochronology, Churchill Province	T.M. Gordon**
C.2.2.2	Metallogeny of Mafic-Ultramafic rocks, Northern Churchill	J.M. Duke**, L. Hulbert
C.3.1.1.	Aeromagnetic gradiometer surveys, Fox Mine area and Ruttan	P.J. Hood
C.4.1.1	Geochemical Surveys - regional lake sediment sampling	E.H.W. Hornbrook
C.4.1.2	Glacial Prospecting	R.N.W. DiLabio, C.A. Kaszycki
C.5.1.1.	Quaternary Atlas Compilation North of 52°	R.N.W. DiLabio

++ GSC
*Applied Geoscience Research co-worker
**See also Flin Flon-Snow Lake district
+++Seasonal field officer

PROJECT 1.1 GEOLOGICAL MAPPING - BIG SAND-BROCHET AREA

INVESTIGATOR: D.C.P. Schledewitz

OBJECTIVE:

To provide geological map and a report of the Brochet and Big Sand Lake area (NTS 64F and 64G west half) and to identify areas with potential for mineral deposits.

PROGRESS:

Fieldwork was completed, and a U-Pb zircon dating program was started with R. Van Schmus, University of Kansas. Compilation of geological field data for final maps and a report are in progress.

PRODUCTS:

Report (GS-2) in Mineral Resources Report of Field Activities 1984.

Provisional compilation maps 1:250 000 with mineral occurrences submitted to GSC for their regional lake bottom sediment geochemical survey program.

FOLLOW-UP AND IMPLICATIONS:

Continuation of U-Pb geochronology program to produce a geochronological framework of the Trans-Hudsonian orogen.

The mapping will be used as a data base for interpretation of the regional lake bottom sediment geochemical survey and the airborne gamma ray spectrometer survey conducted by the GSC. Identification of a new belt of mineral occurrences could lead to additional mineral exploration activity north of Lynn Lake.

PROJECT 1.2 URANIUM/LEAD ISOTOPE INVESTIGATIONS, SOUTHERN CHURCHILL PROVINCE

INVESTIGATORS: D.A. Baldwin, A.H. Bailes, E.C. Syme*, H.V. Zwanzig (Geological Services Branch); T.M. Gordon*, P.A. Hunt, R.D. Stevens (Geological Survey of Canada)

OBJECTIVES:

To determine, by U/Pb isotope analysis, the ages of selected rock units in the Lynn Lake and Flin Flon regions. Accurate ages of volcanic and intrusive rock units comprise an essential part of the geological data base, and indirectly date the formation of enclosed base and precious metal deposits.

PROGRESS:

Samples were collected during the 1982, 1983 and 1984 field seasons. In 1984 four age determinations for rocks in the Lynn Lake-Rusty Lake area were completed in the Geological Survey of Canada geochronology laboratory. Two samples from the Flin Flon belt are being processed and age determinations will be completed by mid-1985. Two staff members of the Geological Services Branch each spent week-long working visits in the GSC geochronology labs, hand picking zircons and becoming acquainted with laboratory procedures.

PRODUCTS:

The results of this project to date were communicated orally at the May, 1985, Annual Meeting of the Geological Association of Canada. An abstract summarizing the results was published in conjunction with that meeting. A technical paper presenting the Lynn Lake data and interpretation is presently being prepared jointly by staff of Manitoba Geological Services Branch and Geological Survey of Canada, to be published in the Canadian Journal of Earth Sciences. As more age determinations are completed they will be reported in technical publications.

FOLLOW-UP AND IMPLICATIONS:

In 1985/86 further sampling will be conducted in the Lynn Lake, Flin Flon and Snow Lake regions, to provide a more comprehensive aspect to the information base now established. These age determinations will permit new interpretations to be made on the timing of geological events in the southern Churchill Province.

*Investigators responsible for project.

PROJECT 1.3 RUBIDIUM-STRONTIUM GEOCHRONOLOGY IN NORTHERN MANITOBA

INVESTIGATOR: G.S. Clark (University of Manitoba)

OBJECTIVE:

The objective of this work, initiated in 1979, is to establish isotopic ages of selected lithological units of the Churchill and Superior structural provinces in northern Manitoba. Geochronology provides the framework essential for reconstructing the sequence of crustal and mineralizing events.

PROGRESS:

Analytical work, and age determinations, were completed for two rock units from the Brochet/Big Sand Lake region of the western South Indian domain. In addition, samples were obtained from a granitic intrusive unit from the Lynn Lake greenstone belt to supplement earlier work from that area. Analyses were completed in 1984.

Analytical work is now in progress to establish isotopic ages for three granites from the southern Churchill Province, and two rock units from the Cross Lake area in the northwestern Superior Province.

PRODUCTS:

The results of analytical work completed in 1984 were reported at the November Open House and in the Manitoba Mineral Resources Report of Field Activities for 1984. These data, and results from earlier work, encompassing several ages of Rb-Sr geochronological studies, are part of manuscripts to be published in the near future.

FOLLOW-UP AND IMPLICATIONS:

Geochemical and isotopic analyses will continue in 1985, as will addtional sample collection related to the current investigations. Samples will also be collected in the 1985 field season to obtain more reliable ages of late faulting in the Churchill-Superior boundary region (a possible control on late-stage mineralization), and the age of intrusion of the Molson dyke swarm. The results from the latter will be compared with existing Pb-Pb and Rb-Sr ages.

The age of granite emplacement in the southern Churchill Province may have implications on the timing of mineralization in the Southern Indian, Lynn Lake and Flin Flon domains. The ages of granite intrusion and faulting in the northern Superior Province may be related to late-stage uranium mineralization and the emplacement of rare-element enriched pegmatites in the Cross Lake and Magill Lake areas.

PROJECT 1.4 STRATIGRAPHIC DRILLING, AGASSIZ METALLOTECT

INVESTIGATOR: M.A.F. Fedikow

OBJECTIVE:

To provide stratigraphic sections of the Agassiz Metallotect along its strike length.

PROGRESS:

The project is redundant and has been cancelled owing to:

i) increased exploration company activities within the Metallotect including diamond drilling of geophysical targets, and related stratigraphic reference sections;

ii) an increase in the delineated strike length from 30 to 65 km of the Metallotect and insufficient funds to realistically provide a stratigraphic framework over this distance; and

iii) the success of the program analyzing heavy mineral and clay-sized fraction separated from basal till samples provides a more cost effective approach.

FOLLOW-UP AND IMPLICATION:

The orientation survey for basal till sampling and analysis undertaken at the Agassiz deposit and the follow-up study at Dot Lake indicate spectacular results for the delineation of Au and As dispersion trains down-ice from known gold mineralization. Accordingly, this method would provide a more broadly applicable alternative to stratigraphic drilling that would assist the exploration community in delineating zones of high gold potential along the entire strike length of the Agassiz Metallotect. This project will be conducted during the upcoming field season and is described in further detail under the heading Project 4.3.

PROJECT 2.1 MINERAL OCCURRENCES, McGAVOCK LAKE AREA

INVESTIGATOR: D.A. Baldwin

OBJECTIVES:

To document and classify mineral occurrences in the McGavock Lake area in order to delineate geological settings likely to contain economic concentrations of base and precious metals (metallotects).

PROGRESS:

One senior, two junior assistants and one senior geologist were employed during the 1984 field season to document mineral occurrences, examine drill core and collect samples.

Forty-one (41) mineral localities were visited. Sixteen (16) warranted detailed mapping or measuring of stratigraphic sections. In the remainder of the occurrences, mineralization was not observed or the paucity of outcrop precluded documentation. At localities with less than 1 per cent (modal) pyrrhotite and pyrite, documentation was not undertaken during this first pass.

Sixty (60) samples were collected for assay and geochemical analysis. Samples have been processed and results tabulated.

Field maps and written reports for each of the 16 localities have been prepared.

PRODUCTS:

Report #GS-4 in the 1984 Report of Field Activities. Location of occurrences are indicated on a map, and summary data for each occurrence are listed in a table accompanying the report. Mineral occurrences have been classified according to the nature of mineralization and brief descriptions presented in the Report of Field Activities.

Files containing detailed field maps, stratigraphic sections, occurrence descriptions and field notes have been prepared.

FOLLOW-UP AND IMPLICATIONS:

Field maps, stratigraphic sections and sketches will be prepared for reproduction together with occurrence descriptions as an Open File report.

During the 1985 field season drill core for unexposed occurrences will be examined and sampled. Occurrences in the Lynn Lake area not visited in 1984 will be examined and, where required, detailed documentation will be undertaken.

Mineral occurrence data will be incorporated in a future report on mineral occurrences in the Lynn Lake Greenstone Belt and on mineral deposit maps scheduled for 1987.

PROJECT 2.2 (2.6.3) GOLD DEPOSITS, CARTWRIGHT LAKE, BEAUCAGE LAKE AND JOHNSON SHEAR

INVESTIGATORS: D. Peck, D.A. Baldwin

OBJECTIVES:

To locate and describe gold occurrences in the Cartwright, Beaucage, Johnson Shear areas to determine the mode of occurrence of the mineralization and establish the origin of the gold mineralization.

PROGRESS:

Studies of gold mineralization in the Cartwright Lake area were undertaken in the 1984 field season on contract to Dr. T. Smith, University of Windsor. One junior assistant was employed to assist D. Peck (M.Sc. student).

The southeast part of Cartwright Lake was mapped in detail. Trenches and prospect pits were examined and mapped. Approximately 300 samples were collected for whole rock and trace element geochemistry, assay, petrographic analysis and a fluid inclusion study.

Sixty (60) thin sections have been prepared for representative rock types. The petrography of these rocks is currently being described and will provide a basis for selecting samples for whole rock geochemical analysis. Drill cores obtained from Sherritt Gordon have been prepared for XRF analyses. Seventeen (17) samples have been analyzed for REE.

Fifteen (15) thin sections were prepared for studying fluid inclusions in quartz veins. Only secondary fluid inclusions were found and this aspect of the study has been abandoned.

A brief progress report has been submitted as part of the requirement of this Applied Geoscience Research Agreement.

FOLLOW-UP AND IMPLICATIONS:

Laboratory work will be continued at the University of Windsor over the next fiscal year. A three-week field program is contemplated for the 1985 field season. Most of 1985 will be devoted to research as part of the M.Sc. thesis to be produced by May, 1986.

PROJECT 2.3 MINERAL OCCURRENCE, LAURIE LAKE AREA

INVESTIGATORS: D.A. Baldwin, P. Stewart

OBJECTIVES:

To document and classify known mineral occurrences in the Laurie Lake and Tod Lake areas, as a basis for delineating regional metallotects and generating the data base required to establish controls affecting the deposition of base and precious metals.

PROGRESS:

One junior geologist with a senior assistant and two junior assistants examined and documented in detail the geology and mineralization at 12 localities in the Laurie Lake and Tod Lake area (64C/12). Field work for the documentation is completed.

Geological maps of the mineral occurrences are completed and a written description of each occurrence has been prepared. Results of 60 samples submitted for assay and geochemical analysis have been obtained. Mineral occurrences have been classified according to the nature of the mineralization.

PRODUCTS:

Report #GS-5 in 1984 Report of Field Activities.

A file for each occurrence containing geological maps and occurrence description has been prepared.

FOLLOW-UP AND IMPLICATIONS:

Occurrence descriptions will be finalized and typed. The data will be incorporated into a report on mineral occurrences in the Lynn Lake Greenstone Belt and a Mineral Deposit map for 64C/12 scheduled for 1987.

PROJECT 2.4 PEAT BOG GEOCHEMISTRY AND AGASSIZ BIOGEOCHEMISTRY

INVESTIGATOR: M.A.F. Fedikow

OBJECTIVE:

To determine whether the trace element content of peat bogs can be used to locate blind stratabound gold mineralization along the Agassiz Metallotect. In addition, the feasibility of regional biogeochemical surveys in establishing exploration targets will be examined.

PROGRESS:

Three students were employed during the summer of 1984 to sample peat bogs overlying: (i) known airborne Input conductors, and (ii) rock units stratigraphically equivalent to the Agassiz mine unit. Sampling was conducted with a CRREL frozen-peat corer at Farley Lake, approximately 40 km northeast of the Agassiz deposit within the Agassiz Metallotect. The Farley Lake area was selected for study because of the presence of Agassiz-type stratigraphy, Input conductors and location. This location was considered to be relatively free from contamination resulting from past mining activity centered on Lynn Lake. A total of 344 permafrost peat cores were collected from 5 grids at Farley Lake from which 1100 samples were taken. The cores are less than 1 m in length in most cases; however, the majority of the cores penetrated through the peat bog and permitted sampling of the underlying sediment. A suite of 30 samples from 5 peat cores was submitted for a sequential partial dissolution AAS analysis of Cu, Ni, Zn, Fe and Mn. These samples will also be analyzed for Au and As by INAA. No results from this orientation survey are available to date. Measurements of pH taken from peat core, bore-hole seepage waters and underlying sediment indicate a narrow range of 5 - 6 with a few measurements of 3 - 3.5. The black spruce (Picea mariana) samples collected

at Farley Lake and Dot Lake are currently being macerated at the Geological Services laboratories. Analyses of these materials is proceeding with a projected completion date of six months.

PRODUCTS:

A short description of this program has been presented in the 1984 Report of Field Activities, The analytical data base, grid and sample location maps with results will be prepared as an Open File report in 1985 upon completion of (i) the orientation survey, and (ii) the remainder of the analytical and interpretive work.

FOLLOW-UP AND IMPLICATIONS:

This project will proceed into 1985 and 1986 with the continuation of primarily laboratory work including data interpretation. Upon completion of this detailed study at Farley Lake a regional peat bog sampling program within the Agassiz Metallotect will be contemplated.

PROJECT 2.5 INDUSTRIAL MINERALS INVESTIGATIONS, LYNN LAKE REGION

INVESTIGATOR: R. Gunter

OBJECTIVE:

To examine, sample, and evaluate reported occurrences of sillimanite, garnet, building stone, and other industrial minerals in the Lynn Lake area. The deposits will be sampled to determine the suitability of the material for industrial mineral uses and those deposits showing some potential will be further examined. Follow-up examination will entail detailed mapping, sampling and possible drilling.

PROGRESS:

Nil

FOLLOW-UP AND IMPLICATIONS:

The 1984 program will be carried out in 1985.

PROJECT 2.6.1 THE STRATIGRAPHY, STRUCTURE AND GEOCHEMISTRY OF THE FOX MINE AREA, NORTHERN MANITOBA

INVESTIGATORS: P.E. Olsen, D.A. Baldwin

OBJECTIVES:

To document the stratigraphic and structural setting of the Fox Lake ore deposit and to provide a framework upon which to develop an exploration model for the mine area.

PROGRESS:

One student was employed (through the University of Manitoba) for three months to assist in mapping, sampling and locating outcrops on the Fox Mine property.

During the months of June through August, 1984, an area of 1400 metres by 500 metres (centrally disposed about the Fox orebody) was mapped at 1:2400 scale. In addition, 3000 metres of diamond drill core were relogged and sampled for thin section and whole rock analyses.

During September, 1984 to March, 1985, 100 thin sections were prepared and examined. In addition, 201 whole rock analyses, complete with CIPW norm calculations, were analyzed by X-ray Assay Laboratories.

Work on structural, petrographic and geochemical data is in progress.

PRODUCTS:

Contribution to 1984 Report of Field Activities (Report #GS-7). Summary report will be submitted as M.Sc. thesis - University of Manitoba. Expected submission date is August, 1985.

FOLLOW-UP AND IMPLICATIONS:

Project completion date is May 1st, 1985. Petrographic, geochemical and structural studies are in progress and will be completed in May of 1985. Synthesis and summarization of information will follow with submission of data tentatively forecast as August, 1985.

PROJECT 2.6.2 ALTERATION ASSOCIATED WITH LAR DEPOSIT

INVESTIGATORS: S. Elliot, E.C. Appleyard, D.A. Baldwin

OBJECTIVES:

To document the geochemistry and mineralogy of the alteration zone associated with the Lar copper/zinc deposit, Laurie Lake.

PROGRESS:

A detailed study of an alteration zone associated with copper/zinc mineralization at the Lar deposit on Laurie Lake commenced in the summer of 1984. This study is being done under contract to Dr. E.C. Appleyard, University of Waterloo, with S. Elliot undertaking the study as an M.Sc. thesis project.

One junior assistant was employed to assist in the field work. The geology of the area around the mineral deposit has been mapped and 60 samples collected for petrographic, whole rock and geochemical analysis.

Sixty (60) thin sections have been made and petrographic analysis is presently under way. Thirty-six (36) samples have been prepared for whole rock and geochemical analysis. Data are available for 21 samples. Results for the other 15 are expected shortly.

PRODUCTS:

a) Report (#GS-6) in 1984 Report of Field Activities.
b) Year end report submitted to Manitoba Energy and Mines as part of the requirements of the Applied Geoscience Research Agreement.

FOLLOW-UP AND IMPLICATIONS:

S. Elliott will have a six- to seven-week field season in 1985. Mapping in the alteration zone will be completed and additional samples collected for whole rock and geochemical analysis. Drill core from the alteration zone will also be examined and sampled.

Whole rock and geochemical data will be treated to determine mobility of elements and volume change in the alteration system. The M.Sc thesis will be completed in 1986.

PROJECT 4.1 BASAL TILL INVESTIGATIONS IN THE FARLEY LAKE AREA

INVESTIGATOR: E. Nielsen

OBJECTIVES:

To evaluate till geochemistry as a method of gold exploration, to test the conceptual model of glacial dispersion in an area of high potential for Au mineralization, and to provide background data for biogeochemical exploration techniques.

PROGRESS:

Three summer students, employed in the summer of 1984, collected 216 basal till samples. Heavy minerals and clay-sized fraction have been analyzed. Visible gold was found in seven (7) heavy mineral samples and eleven (11) samples have anomalous gold values between 100 and 500 ppb. The gold anomalies are generally scattered and are not associated with arsenic anomalies in the clay-sized fraction. Pebble counts, mineralogical determinations, and textural analysis are in progress. Computer analysis of the geochemical data is complete.

PRODUCTS:

An Open File report was released in the spring of 1985 to communicate results of this first phase of till geochemistry.

FOLLOW-UP AND IMPLICATIONS:

The project will be continued in 1985 to cover the area between Farley Lake and Minton Lake to better evaluate till geochemistry as a method of gold exploration.

PROJECT 4.2 BASAL TILL INVESTIGATIONS - LAR DEPOSIT, NOKOMIS LAKE, DOT LAKE

INVESTIGATOR: E. Nielsen

OBJECTIVE:

To evaluate till geochemistry as a method of exploration for base and precious metals in the Lynn Lake area.

PROGRESS:

Three students were employed in the summer of 1984, two as field assistants and one in the lab in Winnipeg.

Eighty (80) basal till samples were collected from around the Lar Cu-Zn deposit. Analysis of the clay fraction shows enrichment of Cu, Pb, and Zn over the alteration zone but little down-ice dispersion.

Fifty (50) samples were collected at Dot Lake (Agassiz deposit) and forty (40) at Nokomis Lake (Kisseynew). Analysis of the clay-size fraction produced As anomalies and the heavy fraction Au anomalies.

PRODUCTS:

Short report (GS-10) in the 1984 Report of Field Activities. An Open File report on the Lar deposit will be prepared in the summer of 1985.

FOLLOW-UP AND IMPLICATIONS:

Additional samples will be collected at Dot Lake in 1985 as the anomaly in the till in this area appears open to the southwest.

The results of the study at Nokomis Lake will be detailed in an Open File report in 1986 along with the results of the 1985 study of glacial dispersion along the same stratigraphic horizon.

PROJECT 5.1 SYNOPTIC GEOLOGICAL COMPILATION MAPS (64B AND 64C)

INVESTIGATOR: H.V. Zwanzig. S. Parker

OBJECTIVES:

To aid mineral evaluation and exploration and provide basic information on the history of crust-forming processes in the Province, in the form of geological compilation maps depicting the distribution, composition and nature of bedrock formations.

PROGRESS:

The compilation project will generate coloured, 1:250 000 scale geological maps with a legend that is compatible with Precambrian rocks throughout Manitoba. The maps are compiled from the most recent geological data base and will include outlines of tectono-stratigraphic domains which differ in their histories of deposition, plutonism and deformation or have separate locations. Domains are keyed to individual columns on the composite legend. The maps will also contain data on mineral deposits, isotopic ages and structure. Marginal notes will give a brief description of the geology of each sheet.

NTS areas 64B and 64C were compiled in a preliminary format in 1984 for use by the GSC lake bottom sampling geochemistry program. A new system of alphameric symbols for group names (or intrusive suites), rock types and subtypes has been devised. The remaining work for 64B and 64C is in progress.

PRODUCTS:

The preliminary version of 64B and 64C was published in the fall of 1984. The worksheets of the final maps were displayed during the November Open House.

NTS areas 64B and 64C are completed on 1:150 000 working scale maps and will be released in final format in 1985.

FOLLOW-UP AND IMPLICATIONS:

The maps will delineate similar types of units throughout the province and will define specific units using codes and colours.

The completed set of maps will serve as a basis for a tectonic map of Manitoba and an improved (1:1 000 000 scale)geological map.

PROJECT 5.2 AND 5.5 DRILL CORE RETRIEVAL AND STORAGE

INVESTIGATORS: P. Doyle, K. Filo

OBJECTIVES:

To encourage mineral exploration in Manitoba by facilitating future re-examination of drill core and alleviating the high costs of redrilling, Precambrian diamond drill core will be collected and stored systematically in existing and new core storage libraries.

PROGRESS:

During year one of the Agreement: 82,282 feet of core were collected (stored and catalogued) from 19 separate field sites, all but 2 retrievals were requested by industry; a new 6,790 sq. ft. core library was constructed in The Pas for $118,240 (or $17.41 per sq. ft.) which increased the core storage capacity for the Flin Flon district by 300%; a new drill core geologist, K. Filo, was hired November 19, 1984; seasonal assistance involved 9 individuals for 502 person days in the field; the Work Opportunity Group of The Pas conducted 487 person days of labour, on rack construction, repair, painting and maintenance at the library in The Pas; Winnipeg Work Experience staff provided 120 person days of work at the Brady Road library site; library improvements, painting, etc. were done at Lynn Lake and Thompson libraries, reorganization, restacking and extensive labelling at Thompson and Brady libraries and relabelling of all core at The Pas; plans and RSF's for the proposed Thompson and Brady libraries were completed; a NTS-based manual data file on the Lynn Lake, Thompson and The Pas library core holdi ;s was completed and a computer-based user index system to total library in entory was initiated which includes computerized core box labelling.

PRODUCTS:

Summary in Report of Field Activities (ES-1). Manual data file on holdings and indexed floor rack plans of each library. Elaborate display on the libraries program and their use at Open House and PDA.

FOLLOW-UP AND IMPLICATIONS:

There were 38 visits/examinations, (mainly industry personnel), to Provincial libraries in year one of the Agreement and 12 additional enquiries. Numerous valuable contacts were made with industry during field collections and visits. A brochure is being prepared by Communications Branch on the drill core program and an informal opening of The Pas shed has been suggested. Plans for the construction of the Thompson library are being finalized and an active field program is expected in year two of the Agreement.

PROJECT 5.3 LYNN LAKE REGION REPORTS AND MAPS

INVESTIGATORS: H.D.M. Cameron, H.P. Gilbert, E.C. Syme, H.V. Zwanzig*

OBJECTIVE:

To provide geological reports, maps and field guides for the Lynn Lake region, including areal reports and special papers on chemistry, stratigraphy and structure.

PROGRESS:

An informal guide book (Zwanzig et al.) and several oral presentations of current work were provided in 1984. A paper on geochemistry (Syme, 1985) is in press and eight maps are in final stages of preparation. Four reports or papers are in preparation with rock description near completion.

PRODUCTS:

Existing products:	Report GP80-1 (Gilbert et al., 1981)Lynn Lake guide book (Gilbert et al., 1982) Ruttan-Lynn Lake guide (Zwanzig et al., 1984)
In press:	Geochemistry of the Lynn Lake area (Syme, 1985)
Maps near completion:	65C/5, 6 and parts of 1, 2 (Zwanzig) 64C/16 (Gilbert) 64C/9 (Cameron)

Listing of Lynn Lake Ruttan directed output since 1976 is also available on request.

FOLLOW UP AND IMPLICATIONS:

Further office work in 1985/86 is required on maps for NTS 64B/13, part of 64F/1 (Gilbert), 64C/13, 14 (Cameron) and reports on stratigraphy and structure by Zwanzig; granites by Cameron and areal geology by Gilbert.

The improved geological definition of the Lynn Lake region will also include projects on geochronology (Projects 1.2, 1.3) and mineral deposit descriptions.

*Principal Investigator

CANADA (GEOLOGICAL SURVEY OF CANADA)

PROJECT C.1.1.1 MINERALIZED ALTERATION ZONES, SOUTHERN CHURCHILL PROVINCE

INVESTIGATOR: E. Froese

OBJECTIVE:

To obtain a description of the mineralogy of hydrothermal alteration zones associated with metamorphosed massive sulphide deposits; suitable as graduate thesis work; involves an increasing laboratory component to 1988.

PROGRESS:

E. Froese investigated and sampled cordierite-anthophyllite rocks from two different geological settings in the Flin Flon area:

1. Felsic volcanic rocks of the Amisk Group.
2. Quartzitic gneisses of the Sherridon Group.

B.A. Barham mapped the surface exposure of the Nicoba sulphide deposit near Lynn Lake and sampled drill core supplied by Sherritt Gordon Mines Limited. This work is the subject of his M.Sc. thesis at Carleton University.

Reports on both studies will be included in Current Research, GSC Paper 85-1B.

All of the 84/85 funds were used.

PRODUCTS:

GSC Paper 85-1B. Current Research.

FOLLOW-UP AND IMPLICATIONS:

This project will continue into 1985/86.

E. Froese will examine metamorphosed alteration zones in the Snow Lake area and sample drill core from several deposits owned by Falconbridge Copper Limited and Hudson Bay Mining and Smelting. Under the supervision of E. Froese, a graduate student (B.A. Barham, Carleton University) will map and sample alteration zones and mineral occurrences in the Lynn Lake area. Laboratory studies will continue after the field season. The work will be described in Current Research.

PROJECT C.1.1.2 METAMORPHISM IN THE LYNN LAKE-LAURIE LAKE AREA

INVESTIGATOR: T.M. Gordon

OBJECTIVE:

To elucidate the metamorphic history of rocks on the southern flank of the Lynn Lake greenstone belt. Thesis study of mineral assemblages and mineral compositions in pelitic and mafic rocks of the Wasekwan group to document the chemical and mineralogical changes and pressure-temperature conditions during metamorphism.

PROGRESS:

Preliminary mapping and sampling were carried out. A Current Research publication completed.

PRODUCTS:

Jackson, S.L. and Gordon, T.M., 1985:
"Metamorphism and structure of the Laurie Lake region, Manitoba" in Current Research, Part A, Geological Survey of Canada, Paper 85-1A.

FOLLOW-UP AND IMPLICATIONS:

This project will continue into 1985/86.

S.L. Jackson and assistant will spend 3 months in field completing mapping and sampling in Laurie Lake area. Budget as estimated. A Current Research report will be published in 1986.

PROJECT C.1.1.3 U/Pb GEOCHRONOLOGY, CHURCHILL PROVINCE

INVESTIGATOR: T.M. Gordon

OBJECTIVES:

To sample selected areas for subsequent zircon U/Pb work (e.g. 1984 Flin Flon-Show Lake area). Work over time of agreement will complement other GSC and ERDA projects and will be arranged in consultation with Manitoba.

PROGRESS:

Twelve samples from the eastern end of the belt were collected. Two of these contain sufficient zircon for analysis and separation procedures have begun.

PRODUCTS:

Published abstract. Baldwin, D.A., Syme, E.C., Zwanzig, H.V., Gordon T.M., Hunt, P.A., and Stevens, R.D. "U/Pb zircon ages from the Lynn Lake and Rusty Lake Metavolcanic Belts, Manitoba: Two ages of Proterozoic magmatism", in Geological Association of Canada-Mineralogical Association of Canada Program with abstracts volume 10, p. A3, 1985, plus manuscript in preparation.

FOLLOW-UP AND IMPLICATION:

This project will continue in 1985/86. Publication of results to date in CJES. Collection of additional material during the summer of 1985 in collaboration with Manitoba MRD personnel.

PROJECT C.2.2.2 NORTHERN CHURCHILL

INVESTIGATOR: L.J. Hulbert

OBJECTIVE:

To characterize mafic-ultramafic bodies with emphasis on their potential for magmatic sulphide (Ni-Cu-Pt) and oxide deposits. The compositions and ore controls of known deposits will be studied, and selected bodies in the area will be characterized.

PROGRESS:

Preliminary investigations of the Lynn Lake gabbro and Fraser Lake pluton (drill core logging; field checking; sampling; review of company data) were begun by L.J. Hulbert. Already an interesting hypothesis concerning the possible origin of the Lynn Lake ores (external source of sulphur from Wasekwan Group metasedimentary and metavolcanic rocks) has been formulated with possible regional significance to exploration.

1984 work was supported by GSC A-base through Manitoba Interim Agreement Commitment.

PRODUCTS:

See above. No formal products to date, internal progress reports only.

FOLLOW-UP AND IMPLICATIONS:

Detailed sampling of sulphides in the Lynn Lake and Fraser Lake intrusions by L.J. Hulbert under the Interim Mineral Agreement has provided new insights into the origin of the Lynn Lake deposits.

Further analytical work on the Lynn Lake sulphides (for PGE) and new studies of Cartwright Lake, Granville Lake and Tow Lake bodies will be undertaken.

PROJECT C.3.3.1 AEROMAGNETIC GRADIOMETER SURVEYS

INVESTIGATOR: P.J. HOOD

OBJECTIVE:

To provide completed aeromagnetic gradiometer maps of selected areas. Areas proposed initially by Manitoba. It is anticipated that most or all of the areas will be surveyed during the program but some adjustment of boundaries will be needed. The surveys will be carried out by contractors.

PROGRESS:

A contract was awarded to Kenting for 10,000 line km. Areas covered in 1984 were: Lynn Lake, 64C/11, 64C/14 (excluding parts flown previously), 64C/12 and Ruttan, 64B/5, 64B/6, 64B/11 and 64B/12 (parts of) completed maps will be released in FY 85/86. Cost of this contract exceeded the $285,000 allocated, however funds were found elsewhere to cover the shortfall.

PRODUCTS:

Internal progress reports.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86. Activities will be:

1. Complete Survey being carried out by Kenting Earth Sciences Ltd. under the contract commenced in 1984-85 and publish the maps from that survey.
2. Award contract for high resolution surveys of the Namew Lake and Sherridon areas of northern Manitoba (amounting to about 13,000 line km). The NTS areas proposed for 1985-86 would include parts of 63K/3,4,5,6,12,13,15,16 and all of 63N/1,2. Completed maps will be published in 1986-87 by the GSC. The digital data will also be available for use by the mineral industry. P.J. Hood is the Technical Authority and E. Ready is the Technical Inspector for the contract.

PROJECT C.4.1.1. GEOCHEMICAL SURVEYS

INVESTIGATOR: E.H.W. Hornbrook

OBJECTIVE:

To conduct regional geochemical reconnaissance surveys in selected areas of Manitoba which will be determined after discussions with Provincial counterparts. Sample collection, preparation and analysis will be contracted out while the final open file production and joint release will be done in the GSC. Proposed areas include 64B, F, G, 63-I, N; 53E (part), L (part), 53K (part); 52M (part); 62P (part); 63A (part); 63H (part) and 53D (part).

PROGRESS:

Reconnaissance lake sediment geochemical sampling has been completed under contract in the object areas. Analysis of the samples was done during the winter and maps released early in the new fiscal year.

Discussions between GSC and Manitoba Geological Services have taken place concerning the areas to be surveyed in subsequent years, recognizing particularly the blanketing effect of the glacial lake clays.

PRODUCTS:

Internal progress reports.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985-86. Activities will include:

1. Complete and publish maps arising from Surveys carried out in 1984-85.
2. Carry out, under contract, a regional geochemical lake sediment and water reconnaissance survey in west-central Manitoba over NTS map sheets 63N (part), 63-O ($^{W}/2$) (part) and parts of 63K ($^{N}/2$) for a total area of approximately 28,000 km^2, approximately two 250,000 scale map sheets.

PROJECT C.4.1.2. GLACIAL PROSPECTING

INVESTIGATOR: R.N.W. DiLabio, C.A. Kaszycki

OBJECTIVE:

To do regional mapping of surficial deposits at 1:100K scale, and systematic till sampling of the same areas for geochemical mapping. The work will be done in several different contiguous map areas over the life of the agreement.

84/85	South 1/2 Granville Lake (64C), Brochet (64F).
85/86	Big Sand Lake (64G), North 1/2 Uhlman Lake (64B).
86/87	Kississing Lake (63N).
87/88	South 1/2 Uhlman Lake (64B), W 1/2 Sipiwesk (63P), Nelson House (63-O).
88/89	Final laboratory work and write-up.

PROGRESS:

Six weeks' field work was completed by R. DiLabio, C. Kaszycki and three students. Mapping and collection of till samples were completed for 64F and south half of 64C. Analysis of samples and geological interpretation are underway. Funds and person-years assigned to the project for 1984-85 will be utilized.

PRODUCTS:

Internal progress reports.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985-86.

Kaszycki and 3 assistants will carry out helicopter-supported field work from a base in Leaf Rapids (late June to early August). Work will consist of air photo interpretation of surficial geology, till sampling and field checking of mapping with observations at a density of about 2.5 per 100 sq. km. Analyses of samples will be done in Ottawa and compiled for publication within the year.

PROJECT C.5.1.1 MANITOBA-NORTH OF 52° LATITUDE

INVESTIGATOR: C.A. Kaszycki, M.D. Clarke

OBJECTIVE:

To produce an atlas showing (a) surficial geology, (b) till geochemistry and (c) granular material resources. Coverage to start in NE corner of area and proceed counter-clockwise using data from Dredge, Klassen, Kaszycki, Clarke, DiLabio (GSC) and Neilsen (MDEM). 'Gaps' in coverage to be filled in by air photo interpretation and a limited amount of field checking. Legends, other specs, style of presentation to be determined by same personnel.

PROGRESS:

M. Clarke has been hired to conduct the air photo interpretation work, which commenced in September. Initial work is on map areas adjacent to the Ontario border. Funds and person years assigned for 1984-85 were utilized.

PRODUCTS:

Internal progress reports.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

M. Clarke will continue air photo interpretation to complete coverage of the region. Field checking of the mapping will be done where possible. It is expected that 2 NTS sheets can be done in the year.

DISTRICT II. FLIN FLON-SNOW LAKE

SUMMARY

Many of the orebodies in this long-established metal-producing region are now becoming rapidly depleted and there is an urgent need to locate new mineable deposits either at greater depths or in hitherto undiscovered or unsuspected geological settings.

Over the five-year term of the Agreement, the Provincial Geological Services Branch and Federal Geological Survey will mount mapping programs and minerals investigations aimed at documenting the geological setting of known mineralization, and determining the structural, chemical and genetic controls that resulted in the formation of copper, zinc, and gold-bearing orebodies.

Detailed 1:20 000 geological mapping in the Flin Flon, Athapapuskow and Reed Lake areas will be conducted in parallel with more regional 1:50 000 mapping, exploring potential gold and tungsten metallotects in the region between Kisseynew and File Lakes.

To the south from Athapapuskow Lake to Hargrave Lake sophisticated state-of-the-art airborne magnetic surveys and scout drilling are being used to develop maps of the buried Precambrian Shield that can be used by industry to trace mineralized formations beneath the limestone cover rocks south to latitude 54°.

Within the greenstone belt itself mineral deposit documentation and geochemical surveys are being focussed on both the copper/zinc and gold deposits in order to develop new exploration techniques and concepts for more widespread application in the region. In this region and the Lynn Lake district the industrial mineral resources are being evaluated to explore the potential for new industries based on abrasives, refractories, building stone or soapstone.

In 1985 the core storage shed at The Pas was extended with construction of two new wings that were completed within budget and on schedule. The core retrieval program added an additional 82 000' to the Province's holdings, and core libraries throughout the Province continued to be used by industry geologists.

PROJECT LISTING:

MANITOBA (GSB)

1.5	1:20 000 scale geological mapping, Flin Flon area	A.H. Bailes, E.C. Syme
1.6	1:50 000 scale geological mapping, Nokomis-Kississing	H.V. Zwanzig
1.7	Scout drilling, Project Cormorant area	I. Hosain, H.R. McCabe
2.7	Gold deposits, Herb Lake area	M.A.F. Fedikow
2.8	Lithogeochemical investigations, Twin Lake area	G.H. Gale
2.9	Mineral occurrence documentation, Flin Flon	G.H. Gale
2.10	Mineral occurrence documentation, File Lake	G.H. Gale & G. Ostry
2.11	Industrial minerals evaluation, Flin Flon-Snow Lake region	VACANT
2.12.1	Susceptibility survey, Project Cormorant	T.W. Millar*, D.H. Hall*
5.5	Drill core retrieval, Flin Flon region (and Manitoba)	P. Doyle
5.6	Sub-Paleozoic compilation program	I. Hosain, A.H. Bailes, W. Weber

CANADA (GSC)

(See also District I: Lynn Lake-Ruttan for Projects C.1.1.1, C.1.1.3, and C.2.2.2.).

C.1.2.1	Sub-Paleozoic Compilation/Core drilling GSC/Precambrian	T.M. Gordon (E. Froese, J.C. McGlynn)
C.2.1.1	Mineral Investigations, Flin Flon-Snow Lake Metallogeny	J.M. Franklin**, A. Galley and D. Ames
C.2.2.1	Metallogeny of Mafic-Ultramafic rocks - Flin Flon-Snow Lake area	R.F.J. Scoates, J.M. Duke

*Applied Geoscience Research co-worker
**GSC Supervisor

PROJECT 1.5 1:20 000 SCALE GEOLOGICAL MAPPING, FLIN FLON AREA

INVESTIGATORS: A.H. Bailes, E.C. Syme

OBJECTIVE:

To provide a sound geological data base for future mineral exploration in the Flin Flon base metal (and gold) mining camp. A major goal, in addition to the production of high quality 1:20 000 scale geological maps, is to stratigraphically subdivide the Amisk Group volcanic supracrustal rocks and place mineral deposits within this stratigraphic framework. A further goal is to identify the environmental conditions that existed at the time of mineralization with a view to determining those conditions that were favourable to deposition of the mineral deposits.

PROGRESS:

In 1984 a short field season completed the final stages of mapping in the Flin Flon-White Lake area. Most activities were directed toward preparation of a report and final map. Almost half the final report was written in late 1984 and early 1985. The map is largely completed with only a few minor changes yet to be made.

Geochemical analysis of least altered rock types in the area reached over 200 samples in 1984, and 20 samples were analyzed for rare earth elements. The geochemical attributes of major volcanic units have been identified and compared.

PRODUCTS:

The Open File Report scheduled for 1984/85 will not be produced in favour of directing effort to completing a final report and map for 1986/87.

In previous years preliminary maps have been made available for the entire map area. Descriptions of major rock units, documentation of stratigraphic subdivisions of supracrustal rocks, and summaries of major findings are given in Report of Field Activities from 1979 to 1984.

FOLLOW-UP AND IMPLICATIONS:

Activity in 1985/86 will be directed entirely towards preparation of a final map and report on the Flin Flon-White Lake ara. This map and report will provide a significant upgrading of the geological data base for the Flin Flon mining camp, such that future exploration in this area can proceed in a more rational and productive manner. The stratigraphic subdivisions of Amisk Group volcanic rocks can be extended beyond the immediate map area and should provide a sound basis for future geological proejects in the Flin Flon district.

PROJECT 1.6 1:50 000 SCALE GEOLOGICAL MAPPING, KISSEYNEW REGION

INVESTIGATOR: H.V. Zwanzig

OBJECTIVES:

The Kisseynew mapping program on the south flank of the Kisseynew Gneiss Belt aims to provide reliable structural and stratigraphic control for precious- and base-metal deposits in the Kisseynew Lake-Sherridon-Batty Lake region. The investigation will establish a new stratigraphic subdivision of the Sherridon Group, distinguish the Nokomis Group from the granitoid complexes, and trace the Amisk Group at the margin of the Flin Flon metavolcanic belt.

PROGRESS:

In 1983 and 1984 a total of 300 km^2 were mapped at a scale of 1:20 000 at Kisseynew, Puffy and Nokomis Lakes to establish a detailed stratigraphy which will be traced and modified during the main 1:50 000 scale mapping program. The position of the gold-bearing ($\pm$ minor tungsten) unit has been accurately defined for 8 km along Nokomis Lake. A conglomerate formation which lies a short stratigraphic distance above the gold deposits at Nokomis and Puffy Lakes has been traced for 50 km.

PRODUCTS:

Three preliminary maps and a report (GS-12) were published in Manitoba Mineral Resources Report of Field Activities 1984. Results were summarized in an oral presentation during the November Open House, in Winnipeg.

FOLLOW-UP AND IMPLICATIONS:

The detailed stratigraphy will be traced during future 1:50 000 scale mapping programs along the Kisseynew south flank.

Regional trace-element geochemical surveys carried out along the amphibolite unit that contains the gold-bearing strata would assist in targetting for gold mineralization.

PROJECT 1.7 SCOUT DRILLING, PROJECT CORMORANT AREA

INVESTIGATORS: H.R. McCabe, W.D. McRitchie, I.T. Hosain

OBJECTIVE:

To assist in determining the geology of the Precambrian basement in an area of thin Phanerozoic sedimentary cover, by means of an in-house diamond drilling core hole program. This program is designed to ground-truth geophysical signatures shown by the airborne gradiometer surveys of the Cormorant area.

PROGRESS:

During the 1984 field season, a three-man drill crew, utilizing a truck-mounted JKS-300 diamond drilling rig, completed a total of 11 holes to Precambrian basement, on targets defined on the basis of airborne gradiometer maps. Prior to drilling, detailed ground magnetometer profiles were run at

each site to determine the precise core hole location. Total drilling amounted to 396 m. Average depth to Precambrian basement was 29 m, and total Precambrian drilled was 163 m, an average of approximately 15 m per hole.

All core has been placed on open file in the departmental core and storage library, preliminary core descriptions have been made, limited petrographic studies carried out, and the resulting information incorporated into the regional data base.

In addition to the 11 sites completed in 1985, 23 additional sites were ground checked and magnetic profiles were run to determine precise locations for subsequent drilling.

PRODUCTS:

All core has been placed on open file in the departmental core and sample library, and preliminary results of the drilling published in the 1984 Report of Field Activities. Petrographic slides and cores are available for examination on request.

FOLLOW-UP AND IMPLICATIONS:

Drilling of the 23 remaining road-accessible targets outlined in 1984 will be continued in 1985, and if necessary in 1986. Additional drill targets may be determined as regional data compilation continues, and the basement geological framework becomes more clearly defined.

PROJECT 2.7 GOLD DEPOSITS, HERB LAKE AREA

INVESTIGATOR: M.A.F. Fedikow

OBJECTIVE:

To determine the geological and/or structural controls of gold deposits in the Herb Lake area in order to establish the nature of the deposits. Possible exploration methodologies for detecting similar types of gold mineralization will also be investigated.

PROGRESS:

Three students and a senior geologist conducted detailed geological mapping and sampling around known mineral occurrences in the Snow Lake-Herb Lake area. Thirty-three (33) occurrences were examined in detail with detailed geology maps prepared and assay samples collected. In addition to this geological data base a suite of 39 outcrop rock samples were collected from the major lithologic units in the area for a first approximation of the background concentrations of a wide range of trace elements. This survey will assist in the interpretation of rock geochemical surveys conducted to locate mineral deposits and/or their associated alteration zones. To date, these samples have been analyzed for Cu, Pb, Zn, Mn, Cd, Fe, Ba, Au, As, Sb, Rb, Sr, Li, Ni, Cr and F by various analytical techniques. These results will be used to guide a larger rock geochemical program to be undertaken in the upcoming summer.

PRODUCTS:

The results to date have been published in the 1984 Report of Field Activities (Report #GS-13). Detailed geology maps, assay results and analytical results from the bedrock geochemical program form the basis for an open file report that will be prepared following the completion of this study.

FOLLOW-UP IMPLICATIONS:

This project will continue in 1985 with mineral deposit documentation on Herb Lake and in the Chisel Mine area. Geochemical programs and the production of 1:50 000 mineral deposit maps will be undertaken. Detailed deposit studies will be initiated in 1985.

PROJECT 2.8 LITHOGEOCHEMICAL INVESTIGATIONS, TWIN LAKE AREA, CRANBERRY PORTAGE

INVESTIGATOR: G.H. Gale

OBJECTIVES:

To delineate the nature and extent of copper and gold mineralization associated with intrusive rocks in the Twin Lake area.

PROGRESS:

During the summer of 1984 two students examined known occurrences of mineralization in the intrusive rocks and sampled selected intrusive bodies and volcanic terrains on a systematic grid. One hundred and ninety-two (192) samples were collected for rock geochemical analysis. The 1-2 kg rock chip samples will be pulverized in a swing mill prior to major and trace element analysis.

PRODUCTS:

Summary in Report of Field Activities (Report #GS-16). Mineral deposit descriptions for the 10 occurrences examined in 1984.

FOLLOW-UP AND IMPLICATIONS:

Approximately 500 rock samples are now available for analyses, including material collected during the initial regional survey in 1981. The analytical work will be undertaken when the University of Manitoba has their XRF equipment operating on a routine basis.

During the 1984 field season it was established that copper mineralization is widespread in intrusive rocks of the Whitefish Lake type at Alberts Lake, Pothook Lake and Lucille Lake. No field work will be done on this project in 1985; further sampling may be undertaken in 1986 if funds are available. A geochemical data base and several university theses are expected from this project by 1989.

PROJECT 2.9 MINERAL OCCURRENCE DOCUMENTATION, FLIN FLON AREA

INVESTIGATOR: G.H. Gale

OBJECTIVES:

To provide detailed maps and written descriptions of all known mineral occurrences in the Flin Flon area. To provide a genetic classification of mineral deposits. To identify and delineate metallotects for further study.

PROGRESS:

Two junior assistants, one senior assistant and a senior geologist examined 75 mineral occurrences during the 1984 field season. Approximately 50 occurrences were mapped in detail and sampled for geochemical analyses. Approximately 10 known occurrences remain to be examined on map sheets 63K/11, 12, 13 and 14. The Twin Lake-Neso Lake shear zones were identified as potential metallotects for follow-up detailed investigations.

PRODUCTS:

Report #GS-15 in 1984 Report of Field Activities. Preliminary mineral deposit files were compiled for approximately 200 mineral occurrences examined in 1984 and prior to 1982. A prototype mineral deposit map for 63K/13 is currently under construction.

FOLLOW-UP AND IMPLICATIONS:

Preliminary examination of the remaining 10 occurrences will be undertaken in 1985. Detailed investigation of specific metallotects in 1985 will include Tartan Lake area, Neso Lake shear zone and the Baker Patton-Centennial volcanic stratigraphy and mineral occurrences. This project has proceeded to the point where the investigator has a first-hand knowledge of 95% of the known mineral occurrences and is now in a position to direct research into specific problem areas defined. For example, the 1985 field program includes:

1. A University of Manitoba study of the Vamp Lake deposit because it has been identified as an anomalous massive sulphide deposit type; and
2. The Baker Patton-Centennial metallotect identified as a geological unit with unique exploration problems.

Other research and exploration problems have been identified and will be undertaken later in this program.

PROJECT 2.10 MINERAL OCCURRENCES - FILE LAKE-SHERRIDON AREA

INVESTIGATOR: G. Ostry

OBJECTIVE:

To provide a mineral deposit data base, identify geological factors controlling mineralization and classify mineral occurrences into genetic types. Individual mineral occurrences to be mapped in detail to establish

their geological setting. Lithogeochemical studies will be conducted on selected mineral occurrences and part of the Kisseynew metallotect. To identify specific metallotects for further investigations.

PROGRESS:

One student and a project geologist were employed in the summer of 1984 to assist in locating, mapping and sampling mineral occurrences in the File Lake area of the Flin Flon greenstone belt. Samples for geochemical analysis were collected at most occurrences and subsequently analyzed for Cu, Pb, Zn, Ni, Au, Ag and Mo. All analyses are complete. Rock samples from selected occurrences were submitted for thin section and/or polished slab. All sections and slabs have been completed and studied.

PRODUCTS:

Report #GS-14 in the 1984 Report of Field Activities. Detailed geologic maps, descriptions of mineral occurrences and results of geochemical analyses have been prepared for inclusion in the Mineral Deposit Open File.

FOLLOW-UP AND IMPLICATIONS:

This project will be continued in 1985 with one student and a project geologist employed to aid in the documentation of mineral occurrences in Reed-North Star Lake area of the Flin Flon greenstone belt thereby concluding documentation of mineral occurrences in the East-Central portion of the greenstone belt. Work will continue in the Kisseynew gneiss terrain in 1985. Detailed property mapping and geochemical sampling will be conducted along the "Kisseynew metallotect" with some field work directed to reconnaissance studies in order to outline further extensions of this metallotect.

PROJECT 2.11 INDUSTRIAL MINERALS INVESTIGATIONS, FLIN FLON-SNOW LAKE REGION

INVESTIGATOR: R. Gunter

OBJECTIVES:

To examine, sample and evaluate reported occurrences of sillimanite, garnet, building stone and other industrial minerals in the Flin Flon-Snow Lake area. The deposits will be sampled to determine the suitability of the material for industrial mineral uses and those deposits showing some potential will be further examined. Additional examinations will take the form of detailed mapping, sampling and drilling.

PROGRESS:

The Industrial Minerals Geologist position assigned to this task remained vacant until November, 1984. The program was revised accordingly and a Geologist I and a junior assistant were employed during the summer of 1984 to conduct an initial literature search and a reconnaissance survey of garnet occurrences in the Snow Lake belt. Twenty-six (26) locations were inspected and sampled during a 5-week field program. The samples were classified according to: dominant mineral, mineral forms, average crystal size and host rock.

PRODUCT:

Short report (#GS-17) in the 1984 Report of Field Activities. An evaluation of the existing data base was undertaken to permit the project geologist to familiarize himself with the data and to discover any inadequacies in the data base.

FOLLOW-UP AND IMPLICATIONS:

The results of this program will be integrated into the 1985 field program. Data gathered for this project represent the initial stages of an industrial minerals data base for northern Manitoba.

The 1984 investigations permit an expansion of the 1984 program to be undertaken in 1985. The survey in 1985 will be carried out by a Geologist II with the assistance of a Geologist I and two junior assistants. The 1985 program will include detailed sampling and mapping of selected locations investigated in 1984. Several additional sites, near Snow Lake, will be investigated to determine the industrial mineral potential of metamorphosed alteration zones adjacent to producing base metal mines. Additional work in 1985 will include a reconnaissance survey of the industrial mineral potential of the ultramafics in the Thompson belt.

PROJECT 2.12.1 MAGNETIC SUSCEPTIBILITY MEASUREMENTS - FLIN FLON-SNOW LAKE AREA

INVESTIGATORS: T.W. Millar and D.H. Hall (University of Manitoba)

OBJECTIVES:

To aid in the interpretation of airborne magnetic gradiometer surveys carried out in the Flin Flon-Snow Lake area, by conducting susceptibility measurements on exposed Precambrian bedrock formations and drill core.

PROGRESS:

During the summer of 1984 two students from the University of Manitoba carried out in situ magnetic susceptibility measurements of 250 outcrops in the Flin Flon-Snow Lake area. In addition susceptibility measurements were recorded at 1 metre intervals on the core of 108 holes drilled in the area.

The data obtained have been entered into a microcomputer and statistical analyses will be carried out.

PRODUCTS:

A summary report (GS-19) was prepared for the 1984 Report of Field Activities. A detailed year-end report on the project, including the susceptibility measurements, statistical analysis and the susceptibility values of geological units causing the various gradient signatures has been submitted to Department of Energy and Mines. The project is scheduled for completion in 1985.

FOLLOW-UP AND IMPLICATIONS:

The data gathered from the project will assist the airborne gradiometer interpretation of the Flin Flon-Snow Lake area. The Open File report OF84-2 (Hosain) will be updated incorporating the new data. This will result in a more precise interpretation of the Precambrian geology below the Paleozoic carbonates.

PROJECT 5.6 SUB-PALEOZOIC COMPILATION

INVESTIGATOR: I.T. Hosain

OBJECTIVE:

To compile geological and mineral exploration data for the region south of Flin Flon and Snow Lake (to latitude 54°) into geological maps of the Precambrian basement (specifically that portion covered by Paleozoic carbonates) and to delineate potentially ore-bearing units.

PROGRESS:

Interpretation of the magnetic gradiometer surveys flown over an area straddling the Precambrian-Paleozoic boundary south of the Flin Flon-Snow Lake belt was carried out in 1984. Assessment file data and results of the Scout Drilling program - Project 1.7 - aided in this interpretation. The project was designed to determine if the high mineral potential rocks of the Flin Flon area extend below the Paleozoic sediments.

PRODUCTS:

An Open File report OF84-2 was released in 1984 on the results of the project. The report included an interpreted geological map extending the high mineral potential rocks below the Paleozoic sediments.

FOLLOW-UP AND IMPLICATIONS:

Further airborne gradiometer surveys are planned to extend the 1980-82 coverage southwards. Once the new data become available the report will be updated with the interpreted data. In addition, results from the magnetic susceptibility study by D. Hall will be incorporated in the interpretation.

CANADA (GEOLOGICAL SURVEY OF CANADA)

PROJECT C.1.2.1 SUBPALEOZOIC COMPILATION/CORE DRILLING

INVESTIGATORS: GSC/Pre-C - T.M. Gordon (E. Froese, J.C. McGlynn)

OBJECTIVE:

To investigate, map and interpret Precambrian geology beneath Paleozoic cover rocks adjacent to the edge of the Shield. Involves a geological compilation of sub-Paleozoic basement geology, modelling of geophysical anomalies, correlation with exposed surface geology, geological

synthesis of basement geology, selection targets for drilling, logging of already available and new drill core and production of final synthesis. GSC will be particularly responsible for drill target selection and drilling in areas not accessible from roads. All of this with close consultation and cooperation between GSC and GSB. Appropriate geophysical downhole probes will be used to measure various geological parameters. Paleozoic core will be stored in GSB facilities for study in connection with other projects.

PROGRESS:

Contract is being let to prepare inventory of existing data and preliminary map.

PRODUCTS: Borehole Logging, Cormorant Lake Area (NTS 63K)

The borehole logging unit of the Resource Geophysics and Geochemistry Division logged 4 out of 11 holes drilled by the province (under the Mineral Development Agreement). Magnetic susceptibility and gamma-ray logs were obtained for the basal Palaeozoic rocks and into the underlying Precambrian rocks.

FOLLOW-UP AND IMPLICATIONS:

The project will continue in 1985/86.

Contract will be let in June, 1985.

1. Complete an inventory of available core, company assessment files, geological, and geophysical data. With these data prepare 1:250 000 compilations of geology, EM, gradiometry, total field, and drill hole geology. Due June 1.
2. Log available core and do field checks on exposed Precambrian rocks. Due September 1.
3. Prepare preliminary subsurface geological map and sheet drill holes. Due November 1.
4. Prepare specifications and let drilling contract for December-February.
5. Supervise drilling and core examination. Budget as estimated.

PROJECT C.2.1.1 FLIN FLON-SNOW LAKE METALLOGENY

INVESTIGATOR: J.M. Franklin, A. Galley and D. Ames

OBJECTIVE:

To obtain an understanding of controls in gold, massive sulphide and granitoid-related deposits; alteration, structure, petrology and isotope geochemistry in relation to genesis will be emphasized. The project represents a continuation of existing studies and will involve: regional setting of mineralization in light of the tectonic history of the area; geochemical and isotopic studies; metallogenic comparisons between deposits in the Churchill Province and similar types in Archean terrains. The Flin Flon-Snow Lake area is well known for its massive sulphide deposits and potential for further discoveries exists. Gold deposits in the area have received only brief investigations in the last 30 years. Granitoid-related mineralization is ubiquitous but its economic significance is unknown.

PROGRESS:

A four-person field party under A. Galley (supervised by J.M. Franklin) spent 3 months in 1984 documenting 55 gold occurrences in three main areas: a) Herb Lake Camp; b) Goldfields-Nor Acme; Snow Lake area and Elbow Lake area. Emphasis was on finishing documentation of Herb Lake Camp started by Franklin in 1981, and in preliminary investigations in the other two areas, to be followed up by more detailed studies in 1985. A paper on 1984 results appeared in GSC Current Research (85-1A), a paper was delivered at Manitoba Current Activities review and a poster session was presented at GSC Current Activities Forum, Ottawa, January 1985.

PRODUCTS:

Galley, A., Ames, D., and Franklin, J.M., Preliminary investigation of gold occurrences in the Flin Flon-Snow Lake Belt, Manitoba and Saskatchewan; in Current Research, Part A, Geological Survey of Canada, Paper 85-1A, p. 761-771, 1985.

Paper about preliminary investigations of gold occurrences in the Flin Flon-Snow Lake Belt at Manitoba Current Activities Forum November, 1984, Winnipeg. "Poster about Gold Investigations", Flin Flon-Snow Lake Belt, Manitoba, at GSC Current Activities Forum, January 1985, Ottawa.

FOLLOW-UP AND IMPLICATIONS:

The project will continue in 1985/86.

The work planned for the next season will be carried out by a field party headed by A. Galley and D. Ames with participation by J.M. Franklin and one contract geologist and will focus on problems identified during the past season. Follow-up work will be initiated to document the extent of the lower semi-conformable alteration zone in the Moore Lake basin and will consist of detailed structural, stratigraphic and metamorphic mapping. This alteration occurs approximately 1-1.5 km below the Anderson-Stall horizon and an attempt will be made to establish the relationship of the silicic alteration and chloritic pipes beneath these base metal deposits. A short period of field work will be devoted to the geology of gold deposits in the Elbow Lake area to follow up results from the past season and to prepare for possible further intensive study in this area in 1987. The possibility of obtaining further geochronological data in the belt will be pursued.

PROJECT C.2.2.1 FLIN FLON-SNOW LAKE AREA

INVESTIGATORS: J.M. Duke, R.F.J. Scoates

OBJECTIVE:

To characterize mafic-ultramafic bodies with emphasis on their potential for magmatic sulphide (Ni-Cu-Pt) and oxide mineralization. There has been minimal documentation of the numerous mafic and ultramafic bodies in the area. Initial geochemical and petrological characterization of these bodies over a two year period requiring careful mapping, sampling and analytical work. Part of the initial phase would be undertaken as a Masters thesis project under the supervision of GSC staff. A second phase would include more detailed thesis studies as well as active participation by GSC staff.

PROGRESS:

Through a contract with L. Ayres (University of Manitoba) Jeff Young made preliminary examinations (mapping, sampling) of a) Mikanagan Lake sill (Flin Flon area); b) Reed Lake sill, Jackfish Lake pluton and Chisel Lake pluton in the Reed Lake-Snow Lake area. Variations in metamorphic grade and internal characteristics at these intrusions indicate different ages of emplacement and possibly different original magma compositions. A report has been received from Prof. Ayres and Mr. Young on the results of the 1984 field work.

Allotted 1984/85 funds were expended.

PRODUCTS:

Internal progress reports. Poster sessions - Manitoba Open House and GSC Current Activities Forum. "Investigations of mafic-ultramafic plutons and associated mineralization, Flin Flon-Snow Lake Belt".

FOLLOW-UP AND IMPLICATIONS:

The project will continue in 1985/86.

Mapping of the four plutons examined during 1984/85 by J. Young and L. Ayres of the University of Manitoba will be completed. The Mikanagan and Reed Lake bodies are probably synvolcanic sills. Jackfish Lake is a high-level, syntectonic intrusion. The Chisel Lake body is a post-tectonic intrusion. The ultramafic-mafic plutons on the north side of Reed Lake, and the bodies of Iskwasum Lake, Athapapaskow Lake and Tramping Lake will be examined.

Further general characterization studies may be warranted but will largely depend upon the assessment of results of the first two field seasons. Detailed studies of mineralization will commence.

DISTRICT III. SOUTHEAST MANITOBA

SUMMARY:

Geological mapping and minerals programming in the Bissett region focus primarily on the long-established gold potential of the belt with specific emphasis on new environments for gold deposition, similar to those recently encountered at Hemlo, Ontario. Here, as elsewhere in the Province, programs are heavily biased toward intensive sampling and geochemical assays with much larger numbers of rocks submitted for chemical analysis than ever before. Activities in large part are concentrated on the north and east flanks of the greenstone belt from the Jeep Mine to Wallace Lake and from Bennett Lake to Garner Lake. However, equal emphasis is also given to detailed mapping and sampling in and along the favourable formations east of the San Antonio Mine.

In the Bird River Belt, the initial work on the platinum group element evaluation and chromitite seams is now well advanced and will be suspended after this summer's work commitment.

PROJECT LISTING:

MANITOBA (GSB)

1.8	Rice Lake Geological mapping and sampling	W. Weber, M.T. Corkery & H.P. Gilbert
1.9	Geological mapping, Bird River Sill chromite	J.J. Macek & R.F.J. Scoates++
2.13	Gold mineralizaton in the Bissett-Beresford Lake area	P. Theyer
2.14	Mineral occurrence documentation, Rice Lake Greenstone Belt	P. Theyer
2.15	Genesis of the Gatlan and related gold occurrences, Wallace Lake area	P. Theyer (R. Gaba*)
2.16	Evaluation of mineral potential, Horseshoe Lake area	D.A. Baldwin
2.17	Platinum group element potential, Bird River Sill	P. Theyer
2.18	Chromite in Manitoba	D.M. Watson
2.19	Applied geoscience research, S.E. Manitoba	G.H. Gale & W. Weber

CANADA (GSC)

C.2.1.2	Bissett structural studies	K.H. Poulsen, A. Galley and D. Ames
C.2.2.3	Falcon Lake Stock	R.F.J. Scoates
C.2.2.5	Bird River Sill	R.F.J. Scoates, J.M. Duke, O.R. Eckstrand, B. Williamson

*Applied Geoscience Research co-worker
++GSC

PROJECT 1.8 GEOLOGICAL MAPPING, RICE LAKE

INVESTIGATOR: W. Weber and D. Gaboury*

OBJECTIVE:

To improve the targetting criteria for mineral exploration by generating detailed maps of geological units with known or suspected potential to contain significant levels of gold. Special emphasis will be given to volcanogenic sediments, volcanic and subvolcanic rocks and exhalative strata.

PROGRESS:

The area between former Jeep Mine and Wallace Lake was mapped (1:20 000), although early departure of seasonal investigator did not allow for the amount of detailed coverage as planned.

PRODUCTS:

Preliminary map (1:20 000) and summary report in 1984 Report of Field Activities. An oral presentation was given at Annual Open House in November.

FOLLOW-UP AND IMPLICATIONS:

Some additional field work in 1985 will complete the mapping. Geochemical sampling was undertaken under Project 2.13. A new detailed mapping program will be undertaken between Beresford Lake and Moose River.

*Seasonal Investigator

PROJECT 1.9 GEOLOGICAL MAPPING, BIRD RIVER SILL

INVESTIGATOR: J.J. Macek

OBJECTIVE:

To map in detail the principal geological units of the Bird River Sill complex and to conduct petrologic studies to interpret the origin of the Sill and its potential to contain concentrations of platinum, chromite and base metals; to determine geological controls and extent of chromite occurrences.

PROGRESS:

The initial framework established by R.F.J. Scoates in 1983 for the southern limb of the Bird River Sill was confirmed.

Reconnaissance and follow-up work was conducted in the Cat Lake and Maskwa Creek area where layered gabbro bodies described as "plugs" may be part of the Sill complex.

PRODUCTS:

Results of Bird River Sill investigations are included in the report by D. Watson published in 1984 Report of Field Activities.

FOLLOW-UP AND IMPLICATIONS:

Follow-up detailed petrological studies of the major Bird River Sill units will be undertaken by the Geological Survey of Canada, (R.F.J. Scoates in particular), in relation to chromite and sulphide mineralization.

The area west of Cat Lake will be mapped in detail (1:10 000) using new photography to establish whether there is a geological and mineralogical relationship with the southern limb of the Bird River Sill.

NASA Johnson Space Center, Houston, is continuing petrological research related to the emplacement of the Sill using detailed geochemistry of plagioclase populations and whole rocks.

Project 2.13 GOLD MINERALIZATION IN THE BISSETT-BERESFORD LAKE AREA

INVESTIGATOR: P. Theyer

OBJECTIVES:

To establish the extent and gold content of the San Antonio Mine Unit. To provide detailed maps of the stratigraphy and geochemical signature of the Jeep-Johnston and Wallace-Beresford metallotects. To establish the genesis of gold mineralization in the Bissett-Wallace-Beresford areas.

PROGRESS:

Detailed geological mapping of the San Antonio Mine Unit (SAM Unit) was complemented by the cutting of a continuous sample across part of its thickness. Some of these samples were powdered and analyzed for Au, As, Sb and W. A series of thin sections across the SAM unit was provided to a student to assist in the compilation of a B.Sc. thesis dealing with the composition and metallogeny of the SAM unit. One hundred and sixty (160) rock samples were collected at regular-spaced intervals. These samples were analyzed for Au, As, Sb and W. This lithogeochemical survey was complemented by a series of traverses to study the lithologies in the area.

Detailed geological studies of several gold occurrences in the Bissett-Wallace-Beresford areas were complemented by sampling programs. Special emphasis was placed on mapping and sampling the area north of Beresford Lake characterized by the occurrence of oxide iron formation, base metal sulphides and gold occurrences.

PRODUCTS:

Short report (#GS-24) in the 1984 Report of Field Activities. Analytical data base and sample location maps are plotted on enlarged airphotos and are available on request.

FOLLOW-UP AND IMPLICATIONS:

Delineation of the eastern extent of the SAM unit in 1985 will complete the studies devoted to this rock complex.

Lithogeochemistry of the Jeep-Johnston area yielded very low gold values. Detailed mapping and rock geochemical programs centered on known gold occurrences in the Jeep-Johnston area should elucidate the gold concentration mechanisms. Detailed mapping of occurrences with anomalous gold concentrations should assist in definition of exploration targets.

Detailed mapping and lithogeochemical sampling programs of all gold occurrences will aid the definition of gold metallotects for future study.

Project 2.14 MINERAL OCCURRENCE DOCUMENTATION, RICE LAKE GREENSTONE BELT

INVESTIGATORS: P. Theyer, R. Schmidtke

OBJECTIVES:

To prepare a comprehensive catalogue of mineral occurrences as a basis for establishing the genesis and distribution of mineral occurrences in the area.

PROGRESS:

More than 60 mineral occurrences in the vicinity of Bissett were studied during the summer of 1984. The scope of these studies depended on an assessment of the relative merit of each occurrence. In all cases it involved a detailed cataloguing of the type, size and other parameters of the mineralization. This work was complemented by lithogeochemical sampling of the host rock, veins, ore dumps, etc. Rock samples were powdered and analyzed for Au.

PRODUCTS:

Short report (#GS-24) in the 1984 Report of Field Activities. A compilation of these occurrences including locations plotted on airphotos, nature of occurrences, host lithologies, and assay results.

FOLLOW-UP AND IMPLICATIONS:

This program will be continued in 1985 concentrating on mineral occurrences east of Bissett and employing a Geologist I and one junior geological assistant. Upon completion of this phase emphasis will shift to occurrences west of Bissett. The field component of this program may be completed in 1985.

A compilation of all data in the form of an Open File Report should be completed in 1986.

Project 2.15 GENESIS OF THE GATLAN AND RELATED GOLD OCCURRENCE, WALLACE LAKE

INVESTIGATORS: R. Gaba, P. Theyer

OBJECTIVE:

To study gold occurrences located in the Wallace Lake area to determine:

a) sources of gold mineralization;
b) mechanisms of gold concentration;
c) relationships of intrusive rocks and iron formation to the gold mineralization;
d) relationship between tectonic deformation, distribution of quartz veins and gold; and
e) relationship between stratigraphy and gold mineralization.

PROGRESS:

One senior assistant and a junior assistant were employed in the summer of 1984 mapping the surroundings of the Gatlan gold occurrence located in the western part of Wallace Lake.

Approximately 100 rock samples were collected from representative cross-sections across the sequence. Projects were supplemented by detailed sample series across units of garnetiferous sediments hosting oxide iron formation.

PRODUCTS:

Short progress summary (#GS-25) in the 1984 Report of Field Activities. This summary includes a detailed stratigraphic column and a preliminary geological map at a scale of 1:2000. Analytical data base is available on request. A summary of the progress achieved in the petrological studies that are currently under way will be available by April, 1985.

FOLLOW-UP AND IMPLICATIONS:

The project will continue in 1985 with one senior and one junior geological assistant. Emphasis will shift from the area immediately surrounding the Gatlan showing to the larger Wallace Lake to Stevenson Lake area in an attempt to trace this metallotect over a greater strike length. The insights into the nature of the gold mineralization, its origin, distribution patterns and host rocks, gained in the 1984 season, will augment the scope and the results of this work.

Project 2.16 EVALUATION OF MINERAL POTENTIAL, HORSESHOE LAKE AREA

INVESTIGATORS: D.A. Baldwin, M.A.F. Fedikow, P. Theyer, G. Ostry

OBJECTIVES:

To determine the origin of felsic volcanic rocks and the genesis of known sulphide occurrences in the Horseshoe Lake greenstone belt.

PROGRESS:

Four mineral deposit geologists conducted a three-day reconnaissance in the Horseshoe Lake and Night Owl Lake area. Shorelines and island outcrops were examined to determine the origin of the rock types. Sulphide occurrences accompanied by Input conductors were examined. The surface expressions causing the anomalies were identified. Rock types in the vicinity of the mineralization were also identified; however, stratigraphic relationships of the rocks and sulphide mineralization were not determined in the time available.

PRODUCTS:

A short paper (#GS-26) containing descriptions of the felsic volcanic rocks, andesite flows and breccias, the nature of sulphide mineralization and a generalized geological map with anomaly location is presented in Manitoba Energy and Mines "Report of Field Activities 1984".

The results of the field investigations are:

1. Felsic volcanic rocks are largely redeposited pyroclastic rocks and massive flows. Pyroclastic flow deposits compose a minor amount of the felsic rocks.
2. Andesite flows and pillowed basalt flows are present but stratigraphic relationships are unknown.
3. Bedded siliceous, garnetiferous and rusty weathering sedimentary rocks associated with pillowed flows occur in the vicinity of the input anomalies.
4. Iron sulphides and gold were deposited as chemical sediments in a dominantly clastic environment.

FOLLOW-UP AND IMPLICATIONS:

Follow-up detailed studies on the nature and control of mineralization cannot be undertaken until the distribition of rock types and the volcanic stratigraphy in the Horseshoe Lake and Night Owl Lake areas are better known.

The bedded nature of the rusty rocks and the trend of the Input anomalies suggest the sulphide mineralization forms a stratum. Enquiries from exploration companies suggest that follow-up exploration of the potential stratabound gold-bearing unit will be undertaken in 1985.

Project 2.17 PLATINUM GROUP ELEMENT (PGE) POTENTIAL, BIRD RIVER SILL

INVESTIGATOR: P. Theyer

OBJECTIVE:

To evaluate the distribution and level of PGE within the Bird River Sill.

PROGRESS:

Portable rock saws were used to cut sections across the Archean Bird River Sill. These included an eastern section from the ultramafic base to the anorthositic top of the Sill, giving a virtually continuous rock sample of the differentiated mafic-ultramafic intrusive body; 800 metres to the west a parallel section was cut through the ultramafic portion only. A third transect of short cuts across chromitite seams is located between the eastern and western section.

Petrologic and petrographic investigations were undertaken on regularly-spaced polished rock slabs and thin sections. Petrochemical investigations were performed on samples obtained by powdering a fraction of the rock slice in two metre units. These were followed by analysis of samples 50 cm in length across intervals with anomalous PGE concentrations.

PRODUCTS:

Anomalous platinum and palladium concentrations were detected in several discrete rock layers of the Sill. A pronounced association between the occurrence of PGE and sulphides suggests that collection of PGE by base metal sulphides was an important concentration mechanism. However, PGE was also collected by chrome-spinel as manifested by a well defined correlation.

Petrochemical and petrographic studies indicate a highly complex magmatic history for the Sill. Evidence of multiple injections followed by episodes of undisturbed crystallization and differentiation are interrupted by periods of rapid cooling and/or decompression of the magma chamber characterized by the occurrence of a variety of skeletal crystal forms that are typical in supracrustal magma. An episode of violent turbulence causing erosion of already solidified layers in the magma chamber is indicated by a disrupted rock layer including well-rounded pebbles and cobbles of dunite, chromitite and sulphide-rich agglomerations. Large-scale lateral inhomogeneities in the magma chamber are indicated by differences in the crystallization sequence of the eastern and the western section that are not attributable to tectonic disruption.

Chondrite normalized PGE distribution patterns show a steep positive slope from Os to Pd characteristic of gabbro-related deposits. The sequential appearance of a strong PGE depletion within samples of the upper parts of the ultramafic layer may indicate changes in the composition of the injected magma and/or depletion of PGE prior to final emplacement.

FOLLOW-UP AND IMPLICATIONS:

Ore microscopy and microprobe investigations will identify sulphide phases, platinum group minerals, and their distribution in sulphides and chrome spinel. Detailed studies of petrography, petrochemistry and mineral distribution will clarify the PGE distribution and mode of formation. Of special interest to the mineral industry is the correlation between chromium spinel and PGE. Chrome spinel is associated with high concentrations of magnetite or chrome spinel enriched layers.

Rock layers characterized by higher than background magnetite concentrations or chrome spinel-enriched layers should be detectable with a high resolution magnetometer such as a gradiometer.

Project 2.18 CHROMITE IN MANITOBA

INVESTIGATOR: D.M. Watson

OBJECTIVE:

To determine the nature and extent of the chromite resources of the Bird River Sill, as well as to provide additional information on the distribution of platinum group elements within the intrusion.

PROGRESS:

During the 1984 field season the north limb of the Bird River Sill was examined and sampled for comparison with previous sampling in the northern part of the area. The year's work included examination and evaluation of the Ward, National-Ledin, Bird Lake and Euclid claim groups as well as the Mayville-Pronto area.

PRODUCTS:

A summary report (#GS-27) in the 1984 Report of Field Activities. Analyses of samples collected during 1984 as well as the 1982 and 1983 field seasons are available on a request basis. An Open File report on the tonnages and grades as well as the potential for further discoveries in the Bird River Sill is being prepared for release in 1985.

FOLLOW-UP AND IMPLICATIONS:

The initial phase of the evaluation of Manitoba's chrome resources will be completed with release of the Open File report. Additional work on chromite petrology and occurrence is being undertaken by the Mineral Deposits Division of the Geological Survey of Canada.

Project 2.19 U-Pb ZIRCON GEOCHRONOLOGY, RICE LAKE REGION

INVESTIGATORS: A. Turek*, W.D. Taylor (University of Windsor), and W. Weber

OBJECTIVE:

To determine U/Pb zircon ages for selected rock units from the Rice Lake greenstone belt to provide an absolute chrono-stratigraphy of the area, to assist in identifying gold mineralizing events thus aiding in the targetting for gold exploration.

PROGRESS:

In the summer of 1984, 13 rock units were sampled for mineral separation. Presently, all 13 rocks have been processed. Zircons have been identified in all 13 samples; however, only 10 rocks contain a sufficient quantity of zircons for U-Pb age determinations and of these two will be somewhat difficult to process because of the quality and quantity of zircons isolated.

Field work and laboratory work involved the project leader and two undergraduate students. One of the above students (W.D. Taylor) completed his Honours B.Sc. thesis on the above 13 samples. The thesis reviews the geology and the geochronology of the area. It provides a description of the zircons, together with photomicrographs and SEM Photos. Zircons and other possible minerals containing U as well as impurities were confirmed/identified by XRD as was appropriate. Possible relative ages have been suggested by W.D. Taylor on the basis of the morphology of the zircon crystals.

PRODUCTS:

Short report in Manitoba Mineral Resources Reeport of Field Activities 1984.

"A study of zircon morphology and previous isotope age determinations from rocks of the Rice Lake greenstone belt, southeastern Manitoba". W.D. Taylor (1985) B.Sc. Honours thesis, University of Windsor, 73 pp.

FOLLOW-UP AND IMPLICATIONS:

The next phase of this project involves upgrading of the zircon fractions, as required, by handpicking, abrasion, etc., followed by the isotopic analyses. Referring to the Manitoba Mines Branch Map 71-1/4, the rock units that are suitable for age determinations are: 7a, 22d, 22g, 23, 27, 28, 32c, 32e. It may be possible to do two more samples from units 7a and 19. Generally, the felsic volcanics have very few zircons and are not dateable except for 7a - the Narrows Formation dacite. On the other hand, most of the plutonic rocks have adequate zircons of good quality. Resampling of the felsic volcanics would be desirable as this would aid in the regional correlation. It is planned to conduct sample dissolutions and mass spectrometry in the summer of 1985. These analyses will lead to age determinations to be calculated during the winter of 1985/86.

*Principal Investigator

Project 2.19.2 GEOLOGY OF THE GATLAN GOLD DEPOSIT

(Described under 2.5)

CANADA (GEOLOGICAL SURVEY OF CANADA)

PROJECT C.2.1.2 BISSETT STRUCTURAL STUDIES

INVESTIGATOR: K.H. Poulsen, A. Galley and D. Ames

OBJECTIVE:

To examine regional features directly related to localization of ore; to do detailed structural analysis of selected gold deposits (including San Antonio mine); emphasis of structural controls on mineralization at all scales, address metamorphic and stratigraphic controls where appropriate; to be done in conjunction with similar comparative studies in other terrains, notably at La Ronge in Saskatchewan.

PROGRESS:

K.H. Poulsen spent two weeks in the Bissett area examining regional relationships and the underground workings of the San Antonio Mine. Planar and linear fabric elements are indicative of moderately high strains in the Bissett rocks and will form the subject of detailed surface mapping in 1985. Sericite-carbonate alteration, formerly thought to be a sedimentary sequence, was identified in both the footwall and hanging wall of the host unit of the San Antonio mine. Analytical follow-up on these rocks is in progress. A contract was let to S. Lau and W. Brisbin, University of Manitoba, to study the vein genesis in the San Antonio Mine. Preliminary results show that one vein set is shear zone related, the other a stockwork which is extensional in origin rather than a complementry shear as originally interpreted by Stockwell. A report of progress has been received from Brisbin and Lau.

Allotted 1984/85 funds were expended.

PRODUCTS:

Internal progress reports.

FOLLOW-UP AND IMPLICATIONS:

The project will continue in 1985/86.

A structural analysis of the Rice Lake area will be carried out by a field party headed by D. Ames and A. Galley with participation by K.H. Poulsen. Mapping of fabric elements will be emphasized and the resulting data base will be used as a structural reference for the detailed study and interpretation of the structure of selected gold deposits. The M.Sc. thesis on the vein geometry at the San Antonio Mine will be completed and augmented by a second thesis dealing with kinematic analysis or rocks within the mine. The structural studies initiated at the mine in 1984 by K.H. Poulsen will be

continued along with a mineralogical study of aspects of alteration by D. Ames. A preliminary evaluation of structural aspects of mineralization in the Beresford Lake area will be undertaken in cooperation with W. Weber of Manitoba Mines Branch.

PROJECT C.2.2.3 FALCON LAKE STOCK

INVESTIGATOR: R.F.J. Scoates

OBJECTIVE:

To investigate the petrology, tectonic setting and precious metals content of Falcon Lake stock with regard to primary layered structures, documentation of modally-graded layers, compósition of oxide layers and characterization of the petrotectonic setting. The syntectonic(?) Falcon Lake Stock hosts gold mineralization. The investigation would be undertaken as a Masters thesis, early in the ERDA agreement.

PROGRESS:

W. Mandziuk, graduate student (University of Manitoba) commenced mapping of the Falcon Lake stock through a contract with Prof. W. Brisbin, University of Manitoba. Work so far has documented previously unrecognized internal layering and extensive xenolith zones in the gabbro-granodiorite sequence. A report on the 1984 field work has been received from Prof. Brisbin and Mr. Mandziuk.

PRODUCTS:

Internal reports. Poster sessions - Manitoba Open House and GSC Current Activities Forum. "Geology and Structure of the Falcon Lake Stock, SE Manitoba".

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

Detailed structural mapping of the complete stock at a scale of 1:50 000, carried out by W. Mandziuk and W. Brisbin of the University of Manitoba, indicates that igneous layering is much more extensive and complex than previously appreciated. The emplacement of the intrusion appears to have been an active, dynamic process involving large volumes of magma and multiple periods of intrusion.

The contract study of the structure, setting and general petrology of the intrusion will be completed. The contract investigation of the mineralization as an M.Sc. thesis project will commence and will involve up to 2 months field work under general supervison of R.F.J. Scoates and K.H. Poulsen. The work will include detailed mapping of occurrences, standard mineralography, electron microprobe studies and possibly fluid inclusion studies. If possible, zircon age determinations of the stock will be undertaken.

The Falcon Lake project will be completed in 1986/87.

PROJECT C.2.2.5 Bird River Sill

INVESTIGATOR: R.F.J. Scoates, J.M. Duke, O.R. Eckstrand, B. Williamson

OBJECTIVE:

To obtain a detailed petrologic understanding of the Bird River Sill and the Associated Magmatic Oxide and Sulphide Mineralization.

PROGRESS:

Preliminary analyses of chromite composition variations based on data received from Watkinson and Hawthorne (Interim Agreement contracts) were carried out at GSC during the summer of 1984. Field visits were made to the sill by Scoates, Eckstrand, Duke and Hulbert to plan detailed mapping and sampling proposed to start in 1985/86.

PRODUCTS:

Internal progress reports. Scoates, R.F.J., Duke, J.M., Thompson, S: Chromite mineralogy of the Bird River Sill. Poster session - GSC Current Activities Forum, and Prospectors and Developers Association.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

Contracts under the Interim Mineral Agreement for approximately 900 electron microprobe analyses (on about 200 samples) have shown that chromites within any given sample show a broad range of compositional variation, including both a magmatic and secondary component, but that there is no difference in composition among samples or even among the six suites of chromite layers within the sill. The results of this contract work are currently being compiled and interpreted, and will be incorporated in a report to be completed in 1985/86.

To build on this data, a detailed mapping of the Chrome Property area will be carried out by B. Williamson under supervision of R.F.J. Scoates. J.M. Duke and R.F.J. Scoates will participate in field work and undertake detailed studies of chromite layers. Quantitative textural studies of chromites will be undertaken. Whole rock chemical analytical work will be undertaken in order to determine cryptic variation within the sill and also the composition of the parent magma.

A future objective is to map in the Dumbarton area to elucidate relationship of sulphide mineralization to the sill.

DISTRICT IV. Thompson

SUMMARY

Much of the work in the Thompson and Pikwitonei region is directed towards an evaluation of mineral resources other than nickel. The principal intent is to explore the potential for diversifying the existing mineral base and, accordingly, projects will focus primarily on the rare-element enriched pegmatites, the known occurrences of vanadium and titanium, and an evaluation of potential gold metallotects both in the Cross Lake greenstone, and gneissic

Pikwitonei terrain. The extent of the anorthosites will also be investigated as will their alumina content and potential to contain economically significant titanium concentrations. Uranium/lead isotope investigations will be used to unravel the complex crustal evolution of this segment of the Superior Province, and a geological compilation program will be initiated to collate and synthesize the economically significant geology of the Churchill-Superior Boundary zone itself.

The study of the rare-element enriched pegmatites will extend to encompass much of the Northern Superior Province. Exploration guidelines stemming from an earlier phase of this work resulted in significantly accelerated exploration activities throughout eastern Manitoba.

PROJECT LISTING:

MANITOBA (GSB)

1.10	Cross Lake northeast, geological mapping and regional evaluation	M.T. Corkery & J.J. Macek
1.11	Cross-Pipestone Lake, geological mapping and granite geochemistry	P.G. Lenton & M.T. Corkery
1.12	Uranium/lead isotope investigations - support sampling	W. Weber & GSC
2.20	Rare-element enriched pegmatite evaluation	P. Černý* & G.H. Gale
5.7	Thompson-Pikwitonei compilation	W. Weber

CANADA (GSC)

C.1.1.4	U/Pb Geochronology, N.W. Superior Province	T.M. Gordon, (J. Percival & K.D. Card)
C.1.1.5	Structural studies, Thompson Belt	E. Froese, T.M. Gordon

*Applied Geoscience Research co-worker

Project 1.10 CROSS LAKE NORTHEAST, GEOLOGICAL MAPPING AND REGIONAL EVALUATION

INVESTIGATORS: M.T. Corkery, J.J. Macek, H.D.M. Cameron

OBJECTIVES:

To stimulate and direct mineral exploration in the Cross Lake-Thompson region, to provide a broader mineral base for the Thompson region by establishing an updated geological data base for supracrustal and ultramafic-anorthositic rocks which contain occurrences of strategic base and precious metals.

PROGRESS:

Geologic mapping in northeast Cross Lake completed the 1:50 000 coverage of the northeast extension of the supracrustal belt. Several gabbro bodies intrude mafic volcanic rocks. Felsic volcanic rocks unconformably overlie the mafic volcanics and gabbros.

Evaluation of titanium- vanadium-bearing ilmenite-magnetite layers within a gabbro-anorthosite complex was initiated. Detailed mapping and sampling was carried out in the western portion of the complex. Oxide-rich samples were assayed for titanium-vanadium and iron, and 23 samples from the gabbro-anorthosite complex have been submitted for geochemical analyses. A magnetometer survey was carried out over the study area.

PRODUCT:

Preliminary map (1984N-1) and a preliminary report (#GS-30) in the 1984 Report of Field Activities describes the findings in the northeast Cross Lake area.

Preliminary report #GS-29 in the 1984 Report of Field Activities documents the preliminary findings of titanium-vanadium concentration in the anorthosite complex.

173 hours of casual labour provided to native residents in the Cross Lake area.

Initial results warrant continuation of this project.

FOLLOW-UP AND IMPLICATION:

A further two- or three-week field study will fill a small gap in the mapping in northeast Cross Lake. This will be followed by a geologic report of the region.

The titanium-vanadium field study will expand eastward along the known magnetic anomaly. Further detailed geologic mapping, documentation of reported magnetite-ilmenite showings and magnetometer surveys will be carried out. Analysis of the field data will include further whole rock geochemistry and titanium-vanadium-niobium-iron assays.

Project 1.11 CROSS-PIPESTONE LAKES GEOLOGICAL MAPPING AND GRANITE GEOCHEMISTRY

INVESTIGATOR: P.G. Lenton

OBJECTIVE:

To identify regions containing rare-element enriched pegmatites, determine the nature of mineralization in the bodies and determine the source and structural control of the intrusions.

PROGRESS:

Work in 1984 involved detailed structural and stratigraphic mapping and extensive sampling for lithogeochemical work in the central Cross Lake area. This area includes all rare-element enriched pegmatites.

Several distinct pegmatite fields in the Cross Lake area were defined by a concurrent project under Dr. P. Černý of the University of Manitoba. Each field has a distinct geochemical character. Detailed mapping has shown these fields each occupy a separate structural block bounded by fault zones. Each block represents a different crustal level with varying structural and metamorphic characteristics. The pegmatites represent a series formed at different crustal depths.

Lithogeochemical studies involving 150 whole rock analyses, isotopic studies (Dr. G.S. Clark, University of Manitoba) and detailed petrography of intrusive and supracrustal rocks are underway.

PRODUCTS:

A short preliminary report and two preliminary maps (1:20 000 scale) were issued in the Report of Field Activities 1984.

FOLLOW-UP AND IMPLICATIONS:

An additional three weeks of field work is required to complete mapping and sampling of the major intrusive terrains at Cross Lake. Subsequent field work for 1985 will shift to the Knee-Magill Lakes area for a period of 8 to 9 weeks.

Chemical and petrologic studies of Cross Lake will continue in 1985.

Project 1.12 U-Pb INVESTIGATIONS, SUPPORT SAMPLING

INVESTIGATOR: W. Weber, T. Krogh (Royal Ontario Museum)

OBJECTIVE:

To collect and provide rock samples for U-Pb isotope investigations to determine the age of the main geological formations and tectonic events in the Thompson-Pikwitonei region to assist in determining the timing and origin of mineralizing events.

PROGRESS:

Nine (9) rock units were sampled and analytical work was started in the Geochronological Laboratory of the Royal Ontario Museum (R.O.M.). (Analytical work funded by Geological Survey of Canada under MDA).

PRODUCT:

Short report in 1984 Report of Field Activities. Internal report on U-Pb ages of 25 zircon fractions.

FOLLOW-UP AND IMPLICATIONS:

Six (6) additional units will be sampled to supplement and improve the newly-acquired U-Pb geochronological framework.

Project 2.20 RARE-ELEMENT ENRICHED PEGMATITE INVESTIGATION

INVESTIGATOR: P. Černý, Department of Earth Sciences, University of Manitoba

OBJECTIVE:

To examine, sample, evaluate and describe occurrences of rare-element enriched pegmatites in the northwest Superior Province of Manitoba. Economic evaluation of pegmatite fields and testing of exploration techniques are important aspects of the program. Commodities evaluated include lithium, cesium, tantalum, niobium, beryllium, tin, rare earth elements, phosphates and industrial minerals for use as refractory and ceramic products.

PROGRESS:

Work concentrated on completing the evaluation of the Cross Lake pegmatite fields and starting the evaluation of Red Sucker Lake pegmatites. Samples of late granitic intrusions in the Cross Lake area were collected for geochemical and isotopic studies. An M.Sc. thesis on the Cross Lake pegmatites (A.J. Anderson) was completed in July, 1984. The study indicates tantalum-niobium mineralization at Cross Lake is sub-economic, but considerable volumes of accessible spodumene exist. The spodumene contains too much iron for ceramic use but might be suitable for lithium carbonate production.

Preliminary work on Red Sucker Lake indicates a low economic potential for this pegmatite field. Three occurrences of rare-element mineralization, one each of lithium, beryllium and tin, were located.

PRODUCTS:

A report on the final investigations at Red Sucker Lake was released in the Manitoba Mineral Resources Division Report of Field Activities 1984. A copy of A.J. Anderson's M.Sc. thesis* was delivered to Energy and Mines in August, 1984. Oral presentations using data generated under the project were given at the Annual Meeting of the Mineral Resources Division, the Annual Meeting of the Geological Association of Canada/Mineralogical Association of Canada, London, Ontario, and at the Symposium Permingeat, Toulouse, France.

Two publications in refereed journals contain data generated under the project.

FOLLOW-UP AND IMPLICATIONS:

Geochemical studies and isotopic studies (G.S. Clark, University of Manitoba) on samples from Cross Lake (granites) and Red Sucker Lake (pegmatites and granites) will continue in 1985-86. Field studies in the coming season will concentrate on Gods Lake and Red Cross Lake.

*Funded in part under the Canada-Manitoba Interim Mineral Agreement (1983-84)

Project 5.7 THOMPSON PIKWITONEI COMPILATION

INVESTIGATORS: W. Weber, J.J. Macek

OBJECTIVES:

To provide a comprehensive and up-to-date regional geological framework for identification of new mineral exploration targets, to broaden the mineral resource base of the nickel-dependent Thompson region.

PROGRESS:

Existing recent mapping (1:50 000) by Hubregtse, Weber, Scoates and Macek was evaluated regarding legend and code for synoptic compilation. An informal working group FONB (Friends of the the Nickel Belt), involving earth scientists from industry, governments and universities was formed during a field trip into the Thompson area.

PRODUCT:

One publication by university researchers was published, one is in preparation, and two publications co-authored by W. Weber are in press.

Metamorphic studies by J.J. Macek are in progress. Evaluation of NASA SIR-B radar imagery taken by Challenger in the fall is in progress at Goddard Space Flight Centre, Texas.

FOLLOW-UP AND IMPLICATIONS:

Two areas presently not covered will be mapped in 1985 as part of Project 1.10. Compilation of data at the scale of 1:150 000 will be started. Further university research will be undertaken.

Projects 1.3, 1.12 and 1.10 are programmed to provide additional data for Project 5.7.

Note: These research projects are using data and rock samples obtained during the most recent 1:50 000 scale surveys.

CANADA (GEOLOGICAL SURVEY OF CANADA)

PROJECT C.1.1.4 U/Pb GEOCHRONOLOGY, N.W. SUPERIOR PROVINCE

INVESTIGATORS: T.M. Gordon; (J. Percival, K.D. Card)

OBJECTIVE:

Contract to T. Krogh, ROM, to sample selected areas for subsequent U/Pb geochronology studies. Details of work to be arranged when funding finalized.

PROGRESS:

The contract with Dr. Krogh was awarded by Supply and Services Canada. Collection of initial samples was done during summer 84. Separation of zircons has begun. 84/85 funding was spent.

PRODUCTS:

Twenty-five analyses have been completed and very precise ages obtained for four units in the Thompson belt.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

Twelve samples on hand will be processed. Further material to be submitted by Manitoba GSB.

Reporting as specified by DSS - quarterly from Nov. 20, 1984.

PROJECT C.1.1.5 STRUCTURAL STUDIES, THOMPSON BELT

INVESTIGATORS: E. Froese, T.M. Gordon

OBJECTIVE:

To determine direction and timing of movement of various crustal blocks, study of shear zones in Thompson Belt; field work based on lakes accessible from Highway 391. Suitable for a Ph.D. level project.

PROGRESS:

A student from the University of Toronto, F. Fueten, and his supervisor, P.Y. Robin visited the Thompson area. A thesis topic was selected to the satisfaction of all concerned, including INCO. Work on the structural geology of the Pipe Mine and the immediate vicinity will begin in 1985.

None of the 84/85 funding was spent. In future years expected requirements are only $10K per year plus 6 person-months or $30K, if done on contract.

PRODUCTS:

No anticipated outputs in 84/85.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

Under the supervision of E. Froese, a graduate student (F. Fueten, University of Toronto) will begin detailed structural mapping of the Pipe 2 open pit and surrounding area. Arrangements for cooperation with INCO have been made.

Laboratory work will begin at the university after the field season. The work will be described in Current Research.

DISTRICT V. NORTHERN SUPERIOR PROVINCE

SUMMARY

Activities in this region, though given lesser priority than those in the other settled mining districts of the Province, are nonetheless vital to support existing mineral exploration interests engaged in the search for gold as well as base metals. Both Island Lake and Gods Lake have historically been gold producers, and new finds of gold mineralization could result in the development of self-contained mining, milling and smelting operations in these relatively remote and inaccessible sectors of the Province. Geological Services Branch programs will entail geological mapping of both Island Lake and Bigstone Lakes, mineral deposit documentation of the Gods Lake sheet and preparation of synoptic geological compilation maps at a scale of 1:250 000 (NTS 53L and 53K) as part of the Precambrian Atlas project.

PROJECT LISTING:

MANITOBA (GSB)

1.13	Northern Superior Greenstone survey - geological mapping and sampling	H.P. Gilbert & W. Weber
5.8	1:250 000 Synoptic geological compilation, Gods Lake	W. Weber

CANADA (GSC)

C.2.2.4	Fox River Sill	R.F.J. Scoates

PROJECT 1.13, 1.14, 1.14.1 GEOLOGICAL MAPPING AT BIGSTONE-KNIGHT LAKES, ISLAND LAKE AND STEVENSON-PONASK LAKE

INVESTIGATORS: H.P. Gilbert, K. Neale*, W. Weber

OBJECTIVES:

To stimulate and direct exploration for gold and base metals in areas of known mineral occurrences and past mines, and where companies are actively engaged in exploration by providing geological maps at a scale of 1:20 000 and 1:50 000 and geological reports of the Island Lake-Bigstone Lake-Stevenson Lake-Ponask Lake areas.

PROGRESS:

Mapping was conducted in 1984 at Island Lake and at Bigstone Lake as a continuation of the regional mapping program initiated in 1981. Examination of data and material collected in the field and geochemical analysis are currently in progress. U-Pb zircon geochronology undertaken by A. Turek in cooperation with W. Weber is completed. This study was partially funded by MDA.

*Seasonal Party Chief

PRODUCTS:

Two preliminary geological maps (Bigstone Lake and part of Island Lake) together with short reports in the Report of Field Activities. Oral presentation of Island Lake geology at the Lake Superior Institute of Geology (May, 1985). Oral presentation and Abstract on geochronology for GAC Annual Meeting co-authored by W. Weber. One publication co-authored by W. Weber in press.

FOLLOW-UP AND IMPLICATIONS:

Reconnaissance mapping will be conducted in 1985 in order to complete the coverage already obtained in the east and west part of Island Lake, and to provide coverage in the Stevenson-Ponask Lakes area and the Knight Lake area. Mapping will be completed in Bigstone Lake-Knight Lake area, west of Island Lake.

Project 5.8 1:250 000 SYNOPTIC GEOLOGICAL COMPILATION, GODS LAKE

INVESTIGATOR: W. Weber

OBJECTIVE:

To prepare a synoptic geological compilation map of the Gods Lake region at a scale of 1:250 000.

PROGRESS:

Compilation of 1:50 000 maps, completed (printed) in 1984, is in progress.

U-Pb geochronology completed by York University researcher (D. Davis) funded by NSERC.

PRODUCT:

Internal working copy of 1:50 000 maps for compilation (not published).

FOLLOW-UP AND IMPLICATIONS:

Compilation of sheet 53L for synoptic compilation. This will be the first compilation sheet of the Superior Province and will contain new information on geology of the Oxford-Gods Lake greenstone belt with good potential for gold and base metal mineralization.

CANADA (GEOLOGICAL SURVEY OF CANADA)

PROJECT C.2.2.4 FOX RIVER SILL

INVESTIGATOR: R.F.J. Scoates

OBJECTIVE:

To document the cryptic variation of silicate mineral compositions complementing other related documentation; to attempt to determine the potential of the intrusion to host magmatic sulphide or oxide deposits. The sill contains rare chromite layers.

PROGRESS:

The contract has been let to A. Turnock (University of Manitoba) and preliminary investigation of primary silicate mineral compositional variations in the 35 cyclic units of the sill has been started.

1984 allotment was expended.

PRODUCTS:

Internal Progress Reports.

FOLLOW-UP AND IMPLICATIONS:

This project will continue in 1985/86.

Electron microprobe analysis for primary minerals in approximately 50 samples have illustrated the primitive character of the original magma.

Data from the scheduled analysis of an additional 100 samples will provide an overall view of the cryptic variation from the base to the top of the intrusion and assist in determining the character of the cryptic variation within individual cyclic units.

Studies of the variation of chromite composition by J.M. Duke and the character of sulphide mineralization and PGE content by O.R. Eckstrand are continuing.

DISTRICT VI. ANCILLARY - MANITOBA GENERAL

SUMMARY

In large part these activities represent Winnipeg-based core retrieval and/or compilation programs aimed at supporting mineral exploration interests throughout the Province. A low level of programming continues to be maintained, however, in southern Manitoba through the ongoing evaluation of the lead/zinc potential in Paleozoic carbonate rocks of the Interlake.

MANITOBA (GSB)

2.21	Lead/zinc potential of carbonate rocks in southern Manitoba	G.H. Gale
5.9	Bibliography and other compliations	W.D. Fogwill et al.
5.10	Rock storage facilities, Winnipeg	D. Berk

CANADA (GSC)

C.5.1.1	Quaternary Atlas Compilation North 52°	R.N.W. DiLabio

(see District I. Lynn Lake-Ruttan)

Project 2.21 LEAD/ZINC POTENTIAL OF CARBONATE ROCKS IN SOUTHERN MANITOBA

INVESTIGATOR: G.H. Gale

OBJECTIVE:

To identify the source of galena float discovered at Balmoral near Winnipeg and establish the potential for lead and zinc deposits in carbonate rocks of Manitoba.

PROGRESS:

Three students were employed in the summer of 1984 to sample selected drill core from Paleozoic rocks and to prepare heavy mineral concentrations from glacial tills collected to determine the usefulness of micro-boulder tracing in the Interlake region of Manitoba. 3,200 rock samples were prepared for analyses from 30 drill cores; 48 till samples were collected from a 40 km^2 area west of Swan Lake.

Heavy mineral concentrates were prepared from the till samples and analyzed for Cu, Zn, Pb, Ni, Mn and Fe. No anomalous values were obtained in the 1984 samples. Approximately one-third of the drill core samples have been analyzed; to date several anomalous sections have been detected. The remaining samples will be analyzed over the next six months.

PRODUCTS:

Short report (#GS-39) in the 1984 Report of Field Activities. The analytical data base is available upon request. The heavy mineral concentrate data base, with sample location maps, will be prepared as an Open File report following receipt of the 1985 analytical data.

FOLLOW-UP AND IMPLICATIONS:

The project will be continued in 1985 with one student employed for 16 weeks. Till samples will be collected in the Dawson Bay area to complete Phase I of the heavy mineral concentrate project. Unless there is some indication of anomalous values in either the heavy mineral concentrates or the clay fraction analyses, this aspect of the project will be terminated.

The drill core sampling will be continued if staff weeks permit. Phase I of this portion of the project should also be completed at the end of the 1985 field season. At that time there will be data from approximately 7,000 samples for six elements. Encoding and massaging of data during 1985 is on hold. This will result in some delay in the project since the data base must be computerized to enable correlation to be made. Phase II of the project will be postponed until data obtained in Phase I is synthesized.

PROJECT 5.9 BIBLIOGRAPHIES, PROMOTION, COMPILATIONS

INVESTIGATOR: W.D. Fogwill, P. Leskiw and others

OBJECTIVES:

To produce bibliographies/indexes for improving access to the large existing geoscience data base of Manitoba and to promote/display Manitoba's mineral potential to attract mineral investment in the Province.

PROGRESS:

Displays were constructed for the Mineral Resources Division's Open House, and Provincial exhibits at the Prospectors Convention in Toronto, March 1985. A services pamphlet was prepared, as well as updated companies and consultants' lists and promotion of the MDA field geological projects under Sector A and the Gradiometer and Core programs. Other work this year included updated Assessment coverage index maps, publication index maps, land-use designations map, Tartan Lake plans/sections and ore estimation, Puffy Lake road compilation and field trips for industry liaison and photography.

PRODUCTS:

Permanent display material. Information pamphlets. Index and informational maps. Photography of mine and exploration sites.

FOLLOW-UP AND IMPLICATIONS:

It is difficult to measure quantitatively the impact of active liaision and promotion with industry through Open Houses, Conventions and personal contact, but it is encouraging to note that all exploration indicators are up substantially this past year and that all available drills in Manitoba are currently operating.

In year two of the Agreement emphasis will shift a little more toward bibliographic and mineral inventory work, dependent on manpower availability.

Project 5.10 BRADY AND PERIMETER CORE SHED CONSTRUCTION PROJECT

RESPONSIBILITY: Gelogical Services Branch/Mines Branch

OBJECTIVES:

To provide functional and suitable storage facilities for Precambrian and Petroleum drill core retrieved from exploration programs in southern Manitoba, as well as rock samples collected during Departmental investigations throughout the Province.

To upgrade the present installation and provide examination areas that will permit industry to review all holdings thereby removing the need to re-drill previously examined prospects/deposits.

PROGRESS:

Initial project outline submitted to Government Services. Project tendered October, 1984 - bids exceed funds available. Project down-scaled to construction of modified Brady III. As a result of repriorization Brady project rated below projects in northern Manitoba. Project placed on hold February, 1985, pending complete re-analysis of storage needs and identification of suitable funding source. Other alternatives are also currently being evaluated. A forklift was purchased to facilitate access to and relocation of drill core on site.

FOLLOW-UP AND IMPLICATIONS:

Principal and most immediate need is for storage facility to house Precambrian drill core which is currently stored externally. Buildings have been constructed, and are planned, for The Pas and Thompson respectively.

3. OUTPUTS - PUBLICATIONS, PRESENTATIONS, DISPLAYS, BROCHURES

MDA PUBLICATIONS AND TECHNICAL INFORMATION RELEASES:

MANITOBA:*

i REPORTS -

Departmental publications
Report of Field Activities
Preliminary Maps

ii UNPUBLISHED REPORTS -

(on file in Manitoba Energy and Mines, Geological Services Branch)

iii EXTERNAL PUBLICATIONS

iv MINERAL DEPOSIT FILES

v DATA FILES

vi PRESENTATIONS -

Mineral Resources Annual Meeting
Other

vii FIELD DEMONSTRATIONS AND REGIONAL BRIEFINGS

viii DISPLAYS

ix PHYSICAL ASSETS (MAJOR)

CANADA:

x REPORTS

Geological Survey of Canada Publications
Report of Field Activities, Manitoba.
Preliminary Maps.

xi UNPUBLISHED REPORTS -

(on file at GSC)

xii EXTERNAL PUBLICATIONS

xiii PRESENTATIONS/DISPLAYS

*Includes output of programming initiated/conducted during the Interim Mineral Agreement (1983)

MANITOBA

1 **REPORTS**:

Departmental Publications

Fedikow, M.A.F.
1984: Preliminary results of biogeochemical studies in the Lynn Lake area. Manitoba Energy and Mines, Geological Services Branch Open File Report OF84-1.

Hosain, I.T.
1985: Interpretation of airborne magnetic gradiometer surveys of the area south of the Flin Flon-Snow Lake belt. Manitoba Energy and Mines, Mines Branch Open File Report OF84-2.

Theyer, P.
1985: Ultramafic rocks of the Island Lake area. Manitoba Energy and Mines, Geological Services Branch, Geological Paper GP84-1.

Watson, D.
In Press: a) Silica in Manitoba. Manitoba Energy and Mines, Geological Services Branch Economic Geology Report ER84-2.

1985: b) Silica potential of the Beausejour area. Manitoba Energy and Mines, Geological Services Branch Open File Report OF85-2.

1985: c) Radiometric Survey of Southeastern Manitoba. Manitoba Energy and Mines, Geological Services Branch Open File Report OF85-1.

Report of Field Activities: (Released November 15, 1984)

Summary of 1984-85 Field Program by W.D. McRitchie

Lynn Lake District:

GS-1 Current geology, geophysical and regional investigations in the Lynn Lake district
by H.V. Zwanzig

GS-2 Geochronology of the Brochet-Big Sand Lake project (U-Pb, zircon)
by D.C.P. Schledewitz

GS-3 Rubidium-strontium age investigations in the Churchill and Superior Structural Provinces, Northern Manitoba
by G.S. Clark (University of Manitoba)

GS-4 Mineral deposit documentation in the Lynn Lake area
by K. Ferreira and D.A. Baldwin

GS-5 Mineral depossit studies in the western Lynn Lake greenstone belt
by P.W. Stewart and K. Brewer

GS-6 A study of the alteration zone associated with the Lar Deposit
by S. Elliott (University of Waterloo)

GS-7 The Geology of the Fox Mine area
by P.E. Olson (Sherritt Gordon Mines)

GS-8 An investigation of gold mineralization at Cartwright Lake, Manitoba
by D.C. Peck

GS-9 Geochemical Studies along the Agassiz Metallotect
by M.A.F. Fedikow, B. Kramarchuk and R.B. Charlesworth

GS-10 Till geochemical investigations in the Lynn Lake and Flin Flon areas
by E. Nielsen and D. Graham

Flin Flon District:

GS-11 Geological Investigations in the Flin Flon area

GS-12 Kisseynew Project: Lobstick Narrows-Cleunion Lake, Puffy Lake and Nokomis Lake areas
by H.V. Zwanzig

GS-13 Mineral deposit studies, Snow Lake area
by A. Gonzales and M.A.F. Fedikow

GS-14 Mineral occurrence studies in the File Lake area of Manitoba
by G. Ostry

GS-15 Mineral deposit investigations in the Flin Flon area
by D. Parbery and G.H. Gale

GS-16 Geochemistry of felsic intrusive and extrusive rocks in the Nisto-Lucille Lake areas, Flin Flon, Manitoba
by R. Wadien and G.H. Gale

GS-17 Industrial minerals reconnaissance in the Flin Flon-Snow Lake district
by R.H. Yamada

GS-18 Stratabound gold mineralization in the Kisseynew gneiss terrain
by G.H. Gale and G. Ostry

GS-19 Magnetic susceptibility of Precambrian rock units in the Flin Flon-Snow Lake region
by D.H. Hall and T.W. Millar (University of Manitoba)

GS-20 Project Cormorant - Sub-Paleozoic investigations south of Flin Flon-Snow Lake
by W.D. McRitchie and I.T. Hosain

Southeast Manitoba District:

GS-21 Wallace Lake project
by D. Gaboury and W. Weber

GS-22 U-Pb zircon investigations in the Rice Lake greenstone belt
by A. Turek* and W. Weber (* University of Windsor)

GS-23 Mineral deposit investigations in the Rice Lake greenstone belt
by P. Theyer

GS-24 Mineral deposit documentation in the Bissett area
by R.H. Schmidtke

GS-25 The Gatland gold occurrence, Wallace Lake
by R.G. Gaba* and P. Theyer (* University of Western Ontario)

GS-26 Evaluation of mineral potential: Horseshoe Lake area, southeast Manitoba
by D.A. Baldwin, M.A.F. Fedikow, P. Theyer and G. Ostry

GS-27 Bird River chromite project
by D.M. Watson

Thompson-Cross Lake District:

GS-28 Cross Lake supracrustal investigations
by M.T. Corkery and P.G. Lenton

GS-29 Pipestone Lake intrusive complex
by H.D.M. Cameron

GS-30 Northeast Cross Lake project
by J.J. Macek

GS-31 U-Pb geochronology studies, Thompson belt and northwestern Superior Province
by T. Krogh*, L. Heaman, N. Machado-Fernandes and W. Weber (*Royal Ontario Museum)

Northwest Superior Province:

GS-32 Island Lake project
by H.P. Gilbert

GS-33 Bigstone Lake project
by K.L. Neale

GS-34 Mineral deposit investigations:
1. Gold occurrences in the Gods Lake area; and
2. Platinum Group metals in the Bird River Sill
by P. Theyer

GS-35 Pegmatitic granites and pegmatites at Red Sucker Lake, Manitoba
by L. Chackowsky and P. Cerny (University of Manitoba)

Manitoba - General:

GS-36 Stratigraphic mapping and stratigraphic and industrial minerals core hole program
by H.R. McCabe

GS-37 Glacial and interglacial deposits in the Hudson Bay Lowlands: a summary of sites in Manitoba
by E. Nielsen and L.A. Dredge

GS-38 Industrial minerals investigations, 1984
by D.M. Watson and C. Kohuska

GS-39 Investigations of lead-zinc potential in Paleozoic rocks of southern Manitoba
by G.H. Gale, E. Nielsen and H.R. McCabe

Exploration Services Section:

ES-1 Manitoba's Precambrian drill core collection program
by P. Doyle

Preliminary Maps 1984: (Released November 15, 1984)

1984B-1 Bigstone Lake (53E, parts of 12NW and NE), Scale 1:20 000
by K.L. Neale, J.G. Bardsley and R.M. Lemoine

1984C-1 Uhlman Lake (64B), Provisional Compilation Map, Scale 1:250 000
by H.V. Zwanzig

1984C-2 Granville Lake (64C), Provisional Compilation Map, Scale 1:250 000
by H.V. Zwanzig

1984I-1 Loonfoot Island (53E/16SE)
by H.P. Gilbert, R. Pertson and B.A. Power

1984K-1 Lobstick Narrows-Cleunion Lake (parts of 63K/13, 14 and 63N/3, 4), Scale 1:20 000 [Supersedes 1983K-1]
by H.V. Zwanzig and D. Seneshen

1984K-2 Puffy Lake (parts of 63K/14, 15 and 63N/2, 3), Scale 1:20 000
by H.V. Zwanzig

1984K-3 Nokomis Lake (part of 63N/2), Scale 1:20 000
by H.V. Zwanzig and D. Seneshen

1984N-1 Northeast Cross Lake (parts of 63-I/11, 12, 13, 14), Scale 1:50 000
by J.J. Macek and P.A. Tirschmann

1984N-2 Southeast Cross Lake-West Pipestone Lake (parts of 63-I/12), Scale 1:20 000 [Supersedes 1984N-3]
by M.T. Corkery, P.G. Lenton and H.D.M. Cameron

1984N-3 Central Cross Lake (part of 63-I/12), Scale 1:20 000
by M.T. Corkery, P.G. Lenton

1984R-1 Wallace Lake West (part of 52M/3), Scale 1:20 000
by D. Gaboury and W. Weber

1984R-2 Geology of the Gatlan area, Wallace Lake (part of 52M/3)
by R. Gaba

ii Unpublished Reports:
(On file in Manitoba Energy and Mines, Geological Services Branch)

Anderson, A.J.
1984: The geochemistry, mineralogy and petrology of the Cross Lake pegmatite field, central Manitoba; unpublished M.Sc. thesis, University of Manitoba, 251 p.

Appleyard, E.C. and Elliott, S.R.
1985: Lithogeochemistry of the Lar alteration zone, Lynn Lake area, Manitoba. Manitoba Geological Services Branch MDA/AGRA Progress Report 1984/85 (University of Waterloo)

Cerny, P.
1985: Rare-element enriched pegmatite evaluation project. Summary Report 1984-85, submitted to Manitoba Energy and Mines as year-end report to Applied Geoscience Research Agreement with University of Manitoba.

Exploration Services Section
1985: Land use designations affecting mineral exploration/development in Manitoba 1984, 1:1 000 000 scale map.

1985: Mineral Exploration Services in Manitoba, Brochure.

Henley, T. and Barrett, D.
1985: Changes in mining activity in the Lynn Lake region: An assessment of IMPACTS. An interim report prepared for Manitoba Energy and Mines by the University of Manitoba, Natural Resources Institute.

Gaba, R.G.
1985: Geology of the Gatlan gold occurrence at Wallace Lake, Rice Lake greenstone belt, southeastern Manitoba. An interim report under the MDA Applied Geoscience Research Agreement between Manitoba Energy and Mines and the University of Western Ontario (26 p.).

Gunter, R.
1985: Summary of information contained in Industrial Minerals Files (commodities A-M). Internal status report.

1985: Evaluation of Glauconite samples from the Swan River area. Internal report.

McRitchie, W.D.
1984: Analysis of Questionnaire to aid in the selection of Sector 'A' Geoscientific programming, internal report. December, 1984.

Millar T.W. and Hall D.H.
1985: Surface sampling of magnetic properties of rocks (Flin Flon-Snow Lake area) submitted to Manitoba Energy and Mines as year end report to Applied Geoscience Research Agreement with University of Manitoba.

Peck, D.
1985: Genesis of the Cartwright Lake gold deposit. Year-end progress statement submitted as requirement of applied geoscience research agreement with Manitoba Energy and Mines.

Schledewitz, D.C.P.
1985: Provisional 1:250 000 Geological Maps for Brochet and Big Sand Lakes (NTS 64F and G). Unpublished compilations for use in planning Regional Lake Sediment Survey by the GSC.

Taylor, W.D.
1985: A study of zircon morphology and previous isotope age determinations from rocks of the Rice Lake greenstone belt, southeastern Manitoba. Year-end status report and B.Sc. thesis, University of Windsor; submitted as requirement of applied geoscience research agreement with Manitoba Energy and Mines.

Watson, D.M.
1984: Industrial Minerals in Manitoba. Internal Report (12 pages)

1984: Radioactivity of building stone material for Durhack (Rat Quarry) - Internal Report.

1985: Report on Industrial Minerals in proposed park extension at Wanipigow Lake.

1985: Distribution of Bentonite in a Miami area subdivision; prepared for Crown Lands and Mining Recorder's office.

Zwanzig, H.V.
1984: Lynn Lake field trip guidebook (background material to tour given in June, 1984, for benefit of industry and other geologists).

iii EXTERNAL PUBLICATIONS:

Anderson, A.J.
1984: Geochemical exploration of the Cross Lake pegmatite field, western Sachigo Sub-province, Manitoba; GAC-MAC Program Abstract 9, p. 41.

Cerny, P. and Ercit, T.S.
1984: Mineralogy and geochemistry of Na and Ta in granitic pegmatites: selected aspects of recent developments. Mineralogy in Science and Industry: Symposium F. Permingeat, Toulous 1984, Program Abstract 12.

1985: Some recent advances in the mineralogy and geochemistry of Nb and Ta in rare-element granitic pegmatites. Bulletin Mineralogie 108 (in press).

Cerny, P. and Meintzer, R.E.
1984: Extreme fractionation in rare-element granitic pegmatites: review of recent data and probable processes. GAC-MAC Program Abstract 9.

Cerny, P. and Meintzer, R.E. and Anderson, A.J.
1984: Extreme fractionation in rare-element granitic pegmatites: selected examples of data and mechanisms. Canadian Mineralogist 23 (in press).

Chackowsky, L. and Cerny, P.
1984: Pegmatiitic granites and pegmatites at Red Sucker Lake, Manitoba; in: Report of Field Activities 1984, Manitoba Mineral Resources Division, p. 133-135.

Ercit, T.S., Anderson, A.J., Cerny, P. and Hawthorne, F.C.
1985: A new phosphate mineral from Cross Lake, Manitoba. GAC-MAC Program Abstract accepted.

Green, A.G., Hajnal, Z. and Weber, W.
1985: An evolutionary model of the western Churchill Province and western margin of the Superior Province in Canada and the north-central United States. Tectonophysics (in press).

McRitchie, W.D.
1985: Highlights, Manitoba Department of Energy and Mines; in: Provincial Geologists' Journal 1984, pp. 42-45.

Turek, A., Weber W., et al
1985: U-Pb zircon ages for rocks from the Island Lake greenstone belt, Manitoba. Canadian Journal of Earth Sciences (in press).

iv MINERAL DEPOSIT FILES

60 files on gold occurrences in the Bissett area
40 files on mineral occurrences in the Lynn Lake area
30 files on gold occurrences in the Snow Lake area
15 files on mineral occurrences in the File Lake area
50 files on mineral occurrences in the Flin Flon area
26 files on industrial mineral occurrences in the Flin Flon area

v DATA FILES:

Flin Flon	200 whole rock chemical analyses and 10 REE analyses on volcanic rocks
Big Sand-Brochet	30 whole rock chemical analyses, including trace elements, from granitic and gneissic rocks
Agassiz deposit	Geochemical data file including analyses from bedrock samples, basal tills, peat and vegetation
Sub-Paleozoic, S.W. Manitoba	Drill logs, magnetic profiles and other geophysical data from Precambrian basement beneath Paleozoic cover rocks in southwestern Manitoba (including Project Cormorant area)

vi PRESENTATIONS:

ANNUAL MEETING - November 15, 1984, Winnipeg

Summary of the Precambrian Geological mapping program
W. Weber

Stratigraphy and structure of the Kisseynew, Puffy Lakes area
H.V. Zwanzig

Mineral investigations in the Churchill Province, Manitoba
G.H. Gale

Geochemical studies along the Agassiz metallotect
M.A.F. Fedikow

Geochemical investigations of till in the Lynn Lake area
R. DiLabio (GSC) and E. Nielsen

Preliminary investigations in the Superior province
P. Theyer

Applied research in northern Manitoba, Department of Earth Sciences, University of Manitoba
L.D. Ayres

Applied research in southern Manitoba and geology of the Fox Mine Lynn Lake; Department of Earch Sciences, University of Manitoba
W.C. Brisbin

Industrial Minerals Activities, 1984
D.M. Watson

Phanerozoic and scout drilling programs
H.R. McCabe

Stratigraphic and structural evolution of the Island Lake greenstone belt
H.P. Gilbert

Cross Lake supracrustal investigations 1983 and 1984
M.T. Corkery

Mineralogy and geochemistry as prospecting tools in the Cross Lake pegmatite field, Central Manitoba
P. Cerny (University of Manitoba)

OTHER PRESENTATIONS:

"Geology and geochemistry of the Agassiz Au-Ag deposit, Lynn Lake"
by M.A.F. Fedikow at C.I.M. Meeting, Lynn Lake area

"Towards the delineation of the mineral potential in the Agassiz Metallotect, Lynn Lake"
by M.A.F. Fedikow at Prospectors and Developers Association Convention, March 1985.

"Industrial Minerals in Manitoba"
by D.M. Watson at Federal Provincial Meeting of Industrial Geologists, October 3-5, 1984.

vii FIELD DEMONSTRATIONS/REGIONAL BRIEFINGS

District I - Lynn Lake

D.A. Baldwin and M.A.F. Fedikow (leaders)
Ruttan-Lynn Lake field trip guidebook contributions for government and industry geologists.

H.V. Zwanzig (leader)
Lynn Lake area for staff of Sherritt Gordon Mines, Manitoba Energy and Mines and Geological Survey of Canada. (Project 5.3).

District II - Flin Flon

A.H. Bailes and E.C. Syme (leaders)
Flin Flon Mine area for staff of Hudson Bay Mining & Smelting and Hudson Bay Exploration & Development to demonstrate new interpretation of the "Flin Flon Mine horizon". (Project 1.5).

H.V. Zwanzig (leader)
Lobstick Narrows area for staff of Hudson Bay Mining & Smelting, Noranda, and GSC. (Project 1.6).

District III - S.E. Manitoba

D.M. Watson and J.J. Macek (leaders)
Tour guides to NASA geologists researching origin of terrestrial anorthosites, Bird River area. (Project 1.9).

D.M. Watson (leader)
Regional and detailed tour of the Bird River Sill given to Aberford Resources geologists (2 days).

District IV - Thompson

W. Weber (leader)
Thompson Belt for staff of INCO, GSC, Universities and Manitoba Energy and Mines (Project 5.7)

District VI - Manitoba

D. Watson (leader)
Assistance given to J. Stewart of University of Manitoba for three days in the verification of peat inventory by remote sensing. Funding provided to assist in preparation of 40-page report on peat resources.

viii DISPLAYS

Annual Meeting with Industry	:	November, 1984 - Winnipeg
Annual Geological Survey of Canada Forum	:	January, 1985 - Ottawa
Annual Prospectors & Developers Conference	:	March, 1985 - Toronto

ix PHYSICAL ASSETS (MAJOR)

Extension to core storage library at The Pas (increasing capacity by 6790 sq. ft.: total cost $118,240.00).

CANADA

x REPORTS

Geological Survey of Canada Publication:

Jackson, S.L. and Gordon, T.M.,
1985: Metamorphism and structure of the Laurie Lake region, Manitoba in Current Research, Part A, Geological Survey of Canada, Paper 85-1A.

Galley, A., Ames, D., and Franklin, J.M.,
1985: Preliminary investigation of gold occurrences in the Flin Flon-Snow Lake Belt, Manitoba and Saskatchewan; in Current Research, Part A, Geological Survey of Canada, Paper 85-1A, p. 761-771.

Barham, B.A.,
1985: The geology of the Nicoba Zn-Cu Deposit, Lynn Lake, Manitoba: Preliminary Results in Current Research, Part B, Geological Survey of Canada, Paper 85-1B (in press)

Froese, E.,
1985: Anthophyllite-bearing rocks in the Flin Flon-Sherridon area, Manitoba, in Current Research, Part B, Geological Survey of Canada, Paper 85-1B (in press).

Report of Field Activities

Neilsen, E. and Dredge, L.A.,
1984: Glacial and interglacial deposits in the Hudson Bay Lowlands: a summary of sites in Manitoba. Manitoba report of field activities GS-37.

PRELIMINARY MAPS

Aeromagnetic gradiometer maps for map sheets (and NTS numbers): Lynn Lake, 64C/11, 64C/14 (excluding parts flown previously), 64C/12 and Ruttan, 64B/5, 64B/6, 64B/11 and 64B/12 (parts of) will be released (in press) in 1985.

Regional Lake Sediment and Water Geochemical Reconnaissance data for NTS 64B (OF. 1103), NTS 64F (OF. 1104) and NTS 64G (OF. 1105) will be released as Geological Survey of Canada 'Open File' maps on June 27th, 1985.

xi UNPUBLISHED REPORTS (ON FILE AT GSC)

Lau, S. and Brisbin, W., (University of Manitoba - contract) - Progress report, Vein genesis in the San Antonio Mine.

Ayres, L.D., and Young, J., (University of Manitoba - contract), Progress reports related to preliminary mapping and sampling of a) Mikanagan Lake sill (Flin Flon area); b) Reed Lake sill, Jackfish Lake pluton and Chisel Lake pluton in the Reed Lake-Snow Lake area.

Mandziuk, W. and Bisbin, W., (University of Manitoba - contract) Progress reports, Mapping of the Falcon Lake Stock.

Turnock, A. (University of Manitoba - contract) Progress reports, Electron microprobe analyses of some Fox River Sill samples for primary silicate mineral compositional variations.

Watkinson, D.; Hawthorne, F. (Contracts) - Progress reports, Electron microprobe analyses of Bird River Sill samples for chromite composition variations.

xii EXTERNAL PUBLICATIONS

Gordon, T.M., Hunt, P.A., and Stevens, R.D. "U/Pb zircon ages from the Lynn Lake and Rusty Lake Metavolcanic Belts, Manitoba: Two ages of proterozoic magmatism" in Geological Association of Canada-Mineralogical Association of Canada Program with abstracts volume 10, p. A3, 1985, plus manuscript in preparation.

xiii PRESENTATIONS/DISPLAYS

GSC Current Activities Forum, January 1985:

Poster about "Gold Investigations, Flin Flon-Snow Lake Belt": Galley, A., Franklin, J.M. and Ames, D.

Poster about "Investigations of mafic-ultramafic plutons and associated mineralization, Flin Flon-Snow Lake Belt": Young, J. and Ayres, L.D.

Poster about "Geology and Structure of the Falcon Lake Stock, SE Manitoba": Mandziuk, W. and Brisbin, W.C.

Poster about Chromite mineralogy of Bird River Sill: Scoates, J., Duke, M., Thompson, P., Hawthorne, F., Watkinson, D., Talkington, R.W., Jones, P.C. and Watson, D.M.

Poster about the vein geometry at the San Antonio mine: Lau, S. and Brisbin, W.C.

Manitoba Annual Meeting-November 15, 1984, Winnipeg

DiLabio, R.N. and Neilsen, E., Geochemical investigations of till in the Lynn Lake area

Findlay, D.C., Geological Survey of Canada Activities under the Canada-Manitoba Mineral Development agreement.

Galley, A., Ames, D. and Franklin, J.M., Preliminary investigations of Gold occurrences, Flin Flon-Snow Lake Belt

Poster sessions - "Investigations of mafic-ultramafic plutons and associated mineralization, Flin Flon-Snow Lake Belt". Young, J. and Ayres, L.D.

Poster sessions - "Geology and Structure of the Falcon Lake Stock, SE Manitoba": Mandziuk, W. and Brisbin, W.C.

Poster sessions - "Vein geometry of the San Antonio mine" Lau, S. and Brisbin, W.

CURRENT STATUS:

The Federal/Provincial Management Committee for the MDA met in Ottawa February 26, 1985 and approved Sectoral Workplans for 1985/86 in which Canada will deliver $3.455 minerals programming and Manitoba $2.35M.

The Workplans for 1985/86 include many projects initiated in 1984/85. A complete listing for Sector A is provided at the end of this section.

Twenty Federal and sixty Provincial projects under Sector A (including contributions contracted through universities in Manitoba and elsewhere in Canada) will continue intensive documentation of geology and mineral resources in northern Manitoba with a principal focus on the Lynn Lake and Flin Flon mining districts (see Table 4).

A substantial body of information has been generated in the Lynn Lake area over the last nine years and an intensive effort is now underway to analyze and process the data collected in the field surveys.

Mapping and minerals investigations in the Flin Flon region will attempt to provide an improved understanding and definition of the Kisseynew metallotect as well as the extremely complex structure and stratigraphy within the greenstone belt itself. Scout drilling of the basement in the Project Cormorant area will continue to expand the framework established in previous years.

Provincial surveys engaged in resource definition and evaluation in the Thompson Belt, the Gods-Island Lakes region, and S.E. Manitoba will be augmented by complementary GSC investigations in several of these areas.

The Province will construct a new drill core shed at Thompson, and will also undertake upgrading and expansion of the core library facilities in Winnipeg.

The annual Meeting with Industry in Winnipeg is currently scheduled for November 19 and 20. The first meeting of the Mineral Exploration Liaison Committee will also take place on or close to this date.

TABLE 4

Forecasted expenditures for Sector A Geoscientific Activities 1985/86

District	LYNN LAKE-RUTTAN	FLIN FLON-SNOW LAKE	SOUTH-EAST MAN.	THOMPSON	NORTHERN SUPERIOR	OTHER	TOTAL
$Allocated (x1000)							
Federal	366.3	717.2	92.5	221.8	73.2	93.0	1564.0
Provincial	327.0	304.0	164.0	273.0	94.0	233.0*	1395.0
Totals	693.3	1021.2	256.5	494.8	167.2	326.0	2959.0
% of Total	23	35	8	17	6	11	100

*Includes $145.0 province-wide drill core retrieval activities; plus compilation of mineral data for all districts.

III: CANADA/MANITOBA MINERAL DEVELOPMENT AGREEMENT

1985/86 WORKPLAN, SECTOR A

FEDERAL & PROVINCIAL PROJECT LISTING

CURRENT STATUS:

The Federal/Provincial Management Committee for the MDA met in Ottawa February 26, 1985 and approved Sectoral Workplans for 1985/86 in which Canada will deliver $3.69M minerals programming and Manitoba $2.35M.

The Workplans for 1985/86 include many projects initiated in 1984/85. A complete listing for Sector A is provided at the end of this section.

Twenty Federal and sixty Provincial projects under Sector A (including contributions contracted through universities in Manitoba and elsewhere in Canada) will continue intensive documentation of geology and mineral resources in northern Manitoba with a principal focus on the Lynn Lake and Flin Flon mining districts (see Table 4).

A substantial body of information has been generated in the Lynn Lake area over the last nine years and an intensive effort is now underway to analyze and process the data collected in the field surveys.

Mapping and minerals investigations in the Flin Flon region will attempt to provide an improved understanding and definition of the Kisseynew metallotect as well as the extremely complex structure and stratigraphy within the greenstone belt itself. Scout drilling of the basement in the Project Cormorant area will continue to expand the framework established in previous years.

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TABLE 4
Forecasted expenditures for Sector A Geoscientific Activities 1985/86

District	LYNN LAKE-RUTTAN	FLIN FLON-SNOW LAKE	SOUTH-EAST MAN.	THOMPSON	NORTHERN SUPERIOR	OTHER	TOTAL
$Allocated (x1000)							
Federal	366.3	717.2	92.5	221.8	73.2	0.0	1471.0
Provincial	327.0	304.0	164.0	273.0	94.0	233.0*	1395.0
Totals	693.3	1021.2	256.5	494.8	167.2	233.0	2866.0
% of Total	24	36	9	17	6	8	100

*Includes $145.0 province-wide drill core retrieval activities; plus compilation of mineral data for all districts.

CANADA - MANITOBA MINERAL DEVELOPMENT AGREEMENT
SECTOR 'A' GEOSCIENTIFIC ACTIVITIES
PROJECT LISTING 1985-86

DISTRICT I: LYNN LAKE - RUTTAN

MANITOBA (Geological Services Branch, GSB)

1.1	Big Sand-Brochet (Report Production)	D.C.P. Schledewitz
1.1.1	U/Pb isotope analyses. Northern Churchill Province	R. Van Schmus*
1.2	U/Pb isotope analyses, Lynn Lake-Ruttan	E.C. Syme**, T. Gordon++
1.3	Rb/Sr isotope investigations, Lynn Lake	G.S. Clark*
2.1	Mineral occurrence documentation, Lynn Lake area	D.A. Baldwin
2.4	Peat bog geochemistry and Agassiz biogeochemistry	M.A.F. Fedikow
2.5	Industrial minerals evaluation, Lynn Lake	R. Gunter
2.6.2	'LAR' deposit alteration	S. Elliot*, G.H. Gale, E.C. Appleyard*
2.6.3	Cartwright Lake gold, Lynn Lake	G.H. Gale, T.E. Smith*
2.22	Mineral occurrence documentation, Barrington Lake area	D. Parbery
2.27	Remote sensing research, Lynn Lake	M.A.F. Fedikow, D.T. Anderson*, W. Moon*
4.1	Basal till investigations, Ruttan & Leclair Lakes	E. Nielsen
4.3	Basal till investigations, Agassiz metallotect	E. Nielsen, M.A.F. Fedikow
5.1	1:250 000 Synoptic geological maps 64B & 64C	H.V. Zwanzig, S. Parker et al
5.3	Lynn Lake Reports and maps	H.V. Zwanzig

CANADA (Geological Survey of Canada, GSC)

C.1.1.1	Mineralized alteration zones, Southern Churchill Province	E. Froese
C.1.1.2	Metamorphism in the Lynn Lake-Laurie Lake area	T.M. Gordon
C.1.1.3	U/Pb geochronology, Churchill Province	T.M. Gordon
C.2.2.2	Ultramafic-mafic metallogency Northern Churchill	J.M. Duke
C.4.1.2	Glacial prospecting	R.N.W. DiLabio
C.4.1.4	Geochemistry/surficial geology test, Granville Lake area	R.N.W. DiLabio, E.W.H. Hornbrook

*Applied Geoscience Research co-worker
++GSC

DISTRICT II: FLIN FLON - SNOW LAKE

MANITOBA (GSB)

1.5.1	1:20 000 geological mapping - Flin Flon[1] (report production)	E.C. Syme
1.5.2	1:20 000 geological mapping - Flin Flon[2] (report production)	A.H. Bailes
1.5.3	1:20 000 geological mapping - Athapapuskow area (reconnaissance)	E.C. Syme
1.5.4	1:20 000 geological mapping - Snow-Reed Lakes area (reconnaissance)	A.H. Bailes
1.6.1	1:50 000 geological mapping - Nokomis area	D.C.P. Schledewitz
1.6.2	1:50 000 geological mapping - Kisseynew area	H.V. Zwanzig
1.6.3	1:50 000 geological mapping - Kisseynew West	W.D. McRitchie
1.7	Scout drilling - Project Cormorant	W. Weber, H.R. McCabe
2.7	Gold deposits, Herb Lake area	M.A.F. Fedikow
2.9	Mineral occurrence documentation, Flin Flon area	G.H. Gale
2.10	Mineral occurrence documentation, File Lake-Sherridon area	G.H. Gale, G. Ostry
2.11	Industrial minerals evaluation, Flin Flon-Snow Lake region	R. Gunter
2.12.2	Geological setting, Vamp Lake West	G.H. Gale, P. Laznicka*
2.24	Copper/zinc deposits, Snow Lake area	M.A.F. Fedikow
2.26	Industrial minerals evaluation, Swan River area	D.M. Watson
4.4	Basal till investigations, Flin Flon area	E. Nielsen
5.5	Drill core retrieval, Flin Flon area	P. Doyle, W.D. Pogwill
5.6	Sub-Paleozoic compilation program	I.T. Hosain, W. Weber, W.D. McRitchie

CANADA (GSC)

C.1.2.1	Sub-Paleozoic compilation/core drilling	T.M. Gordon, E. Froese, J.C. McGlynn
C.2.1.1	Flin Flon-Snow Lake metallogeny	J.M. Franklin
C.2.2.1	Ultramafic-mafic metallogeny Flin Flon-Snow Lake area	J.M. Duke
C.3.1.1	Aeromagnetic gradiometer surveys	P.J. Hood
C.4.1.1	Geochemical surveys	E.W.H. Hornbrook

*Applied Geoscience Research co-worker

DISTRICT III: S.E. MANITOBA

MANITOBA (GSB)

1.8	Rice Lake geological mapping	W. Weber
1.9	Geological mapping - Bird River-Maskwa area	J.J. Macek

DISTRICT III: S.E. MANITOBA (Cont'd)

2.13	Gold mineralization, Wanipigow-Bissett-Beresford area	P. Theyer
2.14	Mineral occurrence documentation, Rice Lake greenstone belt	P. Theyer, P. Stewart
2.15	Genesis of the Gatlan and related gold occurrences, Wallace Lake	P. Theyer
2.17	Platinum group element potential, Bird River and Garner Lake	P. Theyer
2.19.1	U/Pb geochronology, Rice Lake region	A. Turek*
2.19.2	Origin of the Gatlan Gold deposit	R. Hodder*, R. Gaba*, P. Theyer
2.28	Dimension stone resource assessment	D.M. Watson, B. Leathers

CANADA (GSC)

C.2.1.2	Bissett structural studies	K.H. Poulsen
C.2.2.3	Falcon Lake Stock	R.F.J. Scoates
C.2.2.5	Bird River Sill	R.F.J. Scoates

*Applied Geoscience Research co-worker

DISTRICT IV: THOMPSON

MANITOBA (GSB)

1.10	Cross Lake northeast geological mapping	J.J. Macek
1.11	Cross Lake-Pipestone mapping	M.T. Corkery
1.11.2	Pipestone titanium-vanadium project	H.D.M. Cameron
1.12	U/Pb isotope Thompson & Pikwitonei region	W. Weber, T.E. Krogh*
1.16	Rb/Sr isotope investigations, Cross Lake	G.S. Clark*
1.17	Northern Superior pegmatite evaluation	P. Cerny*, P. Lenton
5.5.1	Thompson core shed construction	P. Doyle
5.7	Thompson-Pikwitonei compilation	W. Weber
5.11	Limestone River compilation	W.D. McRitchie

CANADA (GSC)

C.1.1.4	U/Pb geochronology, N.W. Superior Province	T.M. Gordon
C.1.1.5	Structural studies, Thompson Belt	E. Froese, T.M. Gordon
C.3.1.1	Aeromagnetic gradiometer surveys	P.J. Hood

*Applied Geoscience Research co-worker

DISTRICT V: NORTHERN SUPERIOR

MANITOBA (GSB)

1.13	Bigstone Lake mapping 1:50 000	K. Neale

DISTRICT V: NORTHERN SUPERIOR

1.13.1	Stevenson-Ponask reconnaissance	K. Neale
1.14	Island Lake mapping	H.P. Gilbert
1.15	Project management	W. Weber
2.20	Rare-element pegmatite evaluation	P. Cerny*, G.H. Gale
5.8	1:250 000 synoptic geological compilation, Gods Lake	W. Weber

CANADA (GSC)

C.2.2.4	Fox River Sill	R.F.J. Scoates
C.5.1.1	North of 52° latitude: Quaternary Atlas compilation	R.N.W. DiLabio

*Applied Geoscience Research co-worker

DISTRICT VI: MANITOBA GENERAL

MANITOBA (GSB)

2.21	Lead/zinc potential of carbonate rocks in southern Manitoba	G.H. Gale
5.9	Bibliography and other compilations	D. Fogwill et al
5.10	Rock storage libraries, Winnipeg	D. Berk, P. Doyle
5.12	Mineral deposit compilations	G.H. Gale
1.18	Expediting and equipment	J. Athayde, N. Brandson